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ABSTRACT

In 1998, the EdNA/CESCEO Schools Advisory Group (SAG) formed the Networked Learning Resources Working Group to investigate issues surrounding the provision, optimum integration and management of Australian digital learning resources. The Working Group contracted DSTC Pty Ltd, in conjunction with the services of an independent specialist in schools information services, to conduct this consultancy and prepare this discussion paper. The aim of the discussion paper is to: (1) identify current and planned approaches to organizing, accessing, delivering and sharing networked learning resources within the education and cultural sectors; (2) identify opportunities for improving these systems; (3) describe implications of emerging initiatives and possible system improvements for the Schools Advisory Group stakeholders and the broader education community; and (4) make recommendations for common technical approaches amongst the SAG stakeholders in relation to information management techniques. The report first describes the methodology, scope, assumptions and limitations. It then analyzes the use of networked learning resources and makes recommendations for improving technologies and processes associated with accessing and producing networked learning resources in Australian schools. An overview is provided of important networked learning initiatives and technologies from the education, cultural, government, and information technology sectors. The appendices contain a glossary of terms and abbreviations, the survey document, a list of people and organizations consulted, a summary of response to the survey, and a list of current and planned Australian networked learning initiatives as identified by the survey. (Contains 27 references.) (AEF)

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ED 455 839

Integration of Networked Learning Resources in Schools

The following is a discussion paper to the Networked Resources in Schools Working Group of the EdNA/CESCEO Schools Advisory Group describing the findings of DSTC Pty Ltd regarding the issues surrounding the optimum integration of Australian networked learning resources within the educational sector.

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June 1999

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1 Executive Summary

This report is a discussion paper for the Networked Resources Working Group of the EdNA/CESCEO Schools Advisory Group. It describes the findings of DSTC Pty Ltd regarding issues surrounding the optimum integration of Australian networked learning resources within the educational sector. The aim of the discussion paper is to:

1. Identify current and planned approaches to organising, accessing, delivering and sharing networked learning resources within the education and cultural sectors.
2. Identify opportunities for improving these systems.
3. Describe implications of emerging initiatives and possible system improvements for the SAG stakeholders and the broader education community.
4. Make recommendations for common technical approaches amongst the SAG stakeholders in relation to information management techniques.

1.1 Networked Learning Resources

The brief for this report defined networked learning resources as

> "... information resources accessible to students and teachers via computer networks at school or at home. These include Internet accessible resources, materials accessed via a school LAN or Intranet (including school library catalogues those stored on CD-ROM), commercial information services, on-line directory services."

1.2 Current and Planned Networked Learning Approaches

The consultancy surveyed key stakeholders who are running or are planning networked learning projects in Australia. The report details over 50 current and planned networked learning initiatives that responded to the survey. These initiatives are supported by education, government and cultural bodies from every state of Australia.

Goals of Current and Planned Initiatives

In summary, the surveyed initiatives aimed to improve student learning by enhancing

- Access to better quality resources
- The classroom environment
- Student and teacher collaboration
- Customisation of resources to student and classroom needs
- Administrative support for students, teachers and parents

The surveyed initiatives aimed to improve teacher professional development via

- Increased accessibility to quality resources and other professionals
- Increased collaboration between teaching professionals
- Allowing easy customisation of teaching resources by teachers
- Providing access to curriculum support materials

Types of Networked Learning Resources

These goals are met through four main types of networked learning resources:

Resource discovery tools

These allow teachers and students to find resources relevant to their needs. Although these tools are accessed electronically, they can aid discovery of both electronic and physical learning resources.

Information services

These provide access to resources targeted at

- specific learning outcomes, such as the Asian Studies or
- information of a particular type, such as a database of cultural heritage images.

Linkages between information services

via hyperlinks or resource discovery tools.

Collaboration and communication tools

These enhance student, teacher, and parent communication. For example, many of the surveyed information services provide email or web based forums for discussions related to the information they provide.

Key Technologies

The important technologies used in networked learning resources were found to be

Metadata descriptions of resources
Metadata descriptions enhance better discovery of resources by allowing more specific queries for resources, decisions to be made about resources without sighting the resources, and the sharing of evaluations (reviews) of resources.

Controlled Vocabularies
Controlled vocabularies are used to ensure consistent use of language within metadata descriptions. Controlled vocabularies allow Education communities to more effectively understand each other's resource descriptions.

Resource Packaging Technologies
These technologies deliver online content to the desktop and allowing reuse and repackaging of that content.

Harvesters, Databases, Search Engines and Database Access Protocols
These tools collect and organise metadata descriptions about networked resources and make them available for searching online.

1.3 Opportunities, Recommendations, and Implications

The Australian education and cultural sectors are making good use of current technologies to provide innovative networked learning resources. Indeed, some of the Australian projects described in the report are leading the way in the development and deployment of metadata, controlled vocabularies, resource packaging and search engines technologies.

There are, however, still political and technical barriers that are preventing optimal use of networked learning resources within schools. The report

- makes a number of observations regarding these barriers,
- makes recommendations for overcoming these barriers,
- provides broad strategies for implementing those recommendations, and
- analyses the implications of the recommendations for Australian education organisations.

A summary of the barriers, recommendations, strategies and implications follows.

School use of Networked Resources

Barriers:

- Duplication of effort between networked learning resources at a State or local level,
- Difficulty moving resources beyond their initial deployment context,
- The volume of school based content is vast and often difficult to track, and
- Classroom hardware and software limitations

Recommendations and Strategies: Support and extend existing strategies that encourage school use and sharing of networked resources. In particular, support

- Collaborative projects that reuse and enhance existing networked learning resources.
- Networked learning descriptions that refer to local learning outcome statements.
- Promotion, marketing and professional development for existing networked learning resources and initiatives.
- Independence from proprietary software solutions.
- A national collaborative forum to establish agreed strategies for addressing these issues.
- Ongoing mechanisms to track and co-ordinate networked learning initiatives.

Implications for Stakeholders: Modification of existing stakeholder strategies and processes to include more emphasis on communication and co-ordination of efforts with others.

Tracking and influencing standards

Barrier: Standards that are relevant to online provision of learning resources are expensive to track and influence.
Recommendation and Strategies: Relevant technologies should continue to be tracked and influenced by large education organisations such as Education.Au and Curriculum Corporation, which should take input from smaller stakeholders.
Implications for Stakeholders: Formalisation of the role of large collaborative organisations in tracking and influencing standards.

Simple User Oriented Technologies

Barrier: In an online environment resource creators, describers and users are widely distributed and have varying levels of local support and expertise.
Recommendation and Strategies: Investigate tailoring of learning resource software to the needs of education users. This investigation should at least examine

- controlled vocabularies for improving both metadata entry and search interfaces, and
- user and group profiling technologies that allow tools to be tailored to the needs of an individual or group.

Implications for Stakeholders: New user oriented technologies would require major redevelopment of existing tools. The cost of this redevelopment could be justified by the potential for greater use and deployment of networked learning resources.

Subject Vocabularies

Barrier: There is no single subject classification system for Australian learning resources.
Recommendation and Strategies: Investigate a single controlled vocabulary for describing the subject of Australian networked learning resources. The project should investigate

- controlled vocabularies being used in the Australian education community
- the feasibility and costs involved in creating a single Australian education subject vocabulary.

Implications for Stakeholders: A unified subject vocabulary would enhance interoperability between systems and allow standardisation of search interfaces. A unified vocabulary could be costly in terms of potential change for many well-established technologies and processes.

Sharing Evaluative Metadata

Barrier: Evaluative resource descriptions such as reviews and learning outcome assessments have proven difficult to share across systems.
Recommendation and Strategies: Investigate sharing of evaluative metadata between systems. The project should examine

- political barriers to sharing evaluative metadata,
- existing technical solutions for overcoming these barriers, and
- the feasibility of a national standard for describing learning outcomes
- the feasibility of a mechanism that can translate between learning outcomes from different contexts.

Implications for Stakeholders: Evaluative metadata is difficult and costly to produce. This means that stakeholders can reduce costs if they more effectively share evaluative metadata. Producing a national standard for learning outcomes will, however, be a difficult task.

Co-ordinating Metadata Extensions

Barrier: The EdNA metadata standard allows local extension that can lead to duplication of effort.
Recommendation and Strategies: Education.AU formally track extensions to its metadata standard with the intent of co-ordinating extensions that achieve the same goal and incorporating common extensions into the standard.
Implications for Stakeholders: Formalisation of role already undertaken by Education.AU.

Unified Searching for Learning Resources

Barrier: Discovery of learning resources can involve the interrogation of a number of resource databases through a number of separate interfaces.
Recommendation and Strategies: Investigation of unified searching mechanisms for simultaneously discovering networked learning resources in disparate databases. In particular, investigate unified searching for resources referenced in

- The SCIS database and the EdNA directory of resources.
- Education and non-education institutions.
- Local school databases as well as global networked learning resource databases. This would involve examination of
  - the diversity of networked learning databases within schools
  - the potential for these databases to be made available outside their school environment.

Implications for Stakeholders: Unified searching mechanisms will allow easier and broader discovery of networked learning resources. Simultaneous searching of global and local school databases will be costly due to the diversity of databases used within schools. Many stakeholders, however, see this as a key requirement for future networked learning environments.

Sharing and Reuse of Course Materials

Barrier: It is difficult to repackage and reinterpret networked learning resources beyond their initial deployment context.
Recommendation and Strategies: Investigate resource construction and sharing technologies that allow collaborative construction of networked learning resources and easy repackaging and reinterpretation of networked learning resources to meet new requirements.
Implications for Stakeholders: Effective repackaging technologies would allow a reduction in the overall cost of the production of networked learning resources that meet local curriculum requirements. This saving would have to be weighed against the extra cost of producing reusable resources and training users to repackage resources.

Barrier: Lack of technologies and infrastructures for protecting the rights of the authors and custodians of those resources.
Recommendation and Strategies:

- Identify electronic rights management and electronic commerce issues with regard to sharing networked learning resources in Australia,
- Track and inform existing rights management and e-commerce projects of the needs of the Australian education community with regard to electronic commerce and rights management.

Implications for Stakeholders: Wider deployment of commercial networked learning resources may result from technologies that protect the rights of publishers and authors.

2 Introduction

> *A major challenge still exists to provide students and teachers with a better integrated interface to the available learning resources, one which simplifies access but maximises the potential of having access to an expanded resource base and a network of colleagues who are engaged in similar missions" (Networked Resources in Schools Working Group, 1999).*

Learning technologies, as essential tools for teaching and learning, have been embraced by the k-12 education sector at both a National and State system level as well as increasingly by local school communities. The rationale for an investigation into the opportunities for integration of networked learning resources rests with a desire to

- maximise the ways that networked learning resources can promote and improve student learning and assist in teacher development and growth into the 21st Century
- maximise the educational opportunities offered by collaboration between the education sector, commercial and non-commercial, and the host of cultural institutions and organisations within Australia.
- reduce duplication of effort, resources and content development costs
- facilitate the sharing of content, knowledge and expertise across the education and cultural sectors within Australia
- achieve a collaborative, resource-rich learning environment

The range of learning resources available to students and educators through the Internet and school networks is rapidly expanding. Access is being made available to local digital, to online and to non-digital materials. In order to derive maximum educational benefit from the information explosion it is necessary to

- integrate access to these resources from the user's perspective
- use interoperable methods developed in a collaborative manner
- avoid any duplication of effort e.g. in cataloguing or indexing these resources
- develop mechanisms that assist learners to quickly identify the best resources from a range of sources.

Late in 1998, the EdNA/CESCEO Schools Advisory Group (SAG) formed the networked learning resources Working Group to investigate these issues surrounding the provision, optimum integration and management of digital learning resources. The working group contracted DSTC, in conjunction with the services of an independent specialist in schools information services (Rae Fankhauser as recommended by SAG), to conduct this consultancy and prepare this discussion paper.

The aim of this discussion paper is to:

1. Identify current and planned approaches to organising, accessing, delivering and sharing networked learning resources within the education and cultural sectors.
2. Identify opportunities for improving these systems.
3. Describe implications of emerging initiatives and possible system improvements for the SAG stakeholders and the broader education community.
4. Make recommendations for common technical approaches amongst the SAG stakeholders in relation to information management techniques.

2.1 Discussion Paper Structure

We firstly describe of our methodology, its scope, assumptions and limitations. Section 4 then analyses the use of networked learning resources and makes recommendations for improving technologies and processes associated with accessing and producing networked learning resources in Australian schools. Section 5 provides an overview of important networked learning initiatives and technologies form the education, cultural, government and information technology sectors. The appendices contain a glossary of terms and abbreviations, the survey document, a list of people and organisations consulted, a summary of responses to the survey, and a list of current and planned Australian networked learning inititatives as identified by the survey.

3 Summary of Activity

This consultancy commenced with a survey of key stakeholders in the government and non-government systems. The EdNA SAG working group managing the production of this report was consulted regarding the structure and content of the survey, and the list of recipients. The survey asked about

- Vision for future use of networked learning resources
- Existing and planned initiatives for networked learning resources
- How initiatives could be integrated to provide a better service
- Opportunities and Barriers to better collaboration between initiatives

The survey was distributed to key stakeholders as identified by the SAG working group.

A teleconference for all survey respondents was conducted. The summary of the survey results was presented followed by a discussion of

- Metadata issues arising from the survey
- Implications of these issues for current initiatives and projects, that is, what will be the critical points of influence
- What key partnerships with regard to networked learning resources are missing in Australia

3.1.1 Scope

Initially, it was envisaged that a large group of significant players[1] from commercial providers and cultural institutions would be consulted. However, due to the limited timeframe of the consultancy and the geographic distribution of the stakeholders this was not possible.

3.1.2 Assumptions and Limitations

Although this consultancy was required to examine networked learning resource initiatives in Australia, it was never intended that the survey would provide an exhaustive listing of all initiatives, either current or planned.

There were some assumptions made in the survey, that upon review, could have been avoided. For example, it was assumed that respondents were familiar with metadata, web technology and some commonly used abbreviations. Better explanations of technical terms used would have been useful to the respondents who were outside the immediate SAG group. Many respondents also mentioned that the definitions of "networked learning resource" and "initiatives" was too vague. This meant that a large number of initiatives were mentioned that were of varying size and significance, but there was no way to easily differentiate them.

3.1.3 Documents

A copy of the survey and the people consulted are included as Appendix B - Networked Learning Resources Survey and Appendix C - List of people and organisations consulted. Responses from the survey were summarised and are included as Appendix D - Summary of Responses to Survey.

[1] This was a list of possible people to contact and included school-based personnel, subject associations, academics, commercial providers, staff from the educational branches of public museums or libraries, and system level leaders.

4 Discussion and Recommendations

This section provides an analysis of networked learning initiatives in Australia and Internationally, and makes recommendations for improving technologies and processes associated with accessing and producing networked learning resources within Australian schools. Where appropriate, the analysis provides pointers to more detailed discussion of the issues and implications for the stakeholders.

4.1 Current and Planned Networked Learning Initiatives

This consultancy commenced with a survey of key stakeholders who are running or are planning networked learning projects. Over 50 current and planned networked learning initiatives were identified in responses to the survey. These came from education, government and cultural bodies in every state of Australia. A detailed summary of these initiatives appears in Appendix E.

Section 5.2 provides an analysis of the aims of these initiatives with respect to improving student learning and teacher professional development. In summary, the initiatives aim to improve student learning by enhancing

- Access to better quality resources
- The classroom environment
- Student and teacher collaboration
- Customisation of resources to student and classroom needs
- Administrative support for students, teachers and parents

The surveyed initiatives aimed to improve teacher professional development via

- Increased accessibility to quality resources and other professionals
- Increased collaboration between teaching professionals
- Allowing easy customisation of teaching resources by teachers
- Providing access to curriculum support materials

These goals are being met through the provision of networked learning resources that fall into four broad categories:

Resource discovery tools

These allow teachers and students to find resources relevant to their needs. Although these tools are accessed electronically, they can aid discovery of both electronic and physical learning resources. Important examples of these tools are the EdNA Online Directory (see Section 5.3.1) and the SCIS database provided by Curriculum Corporation (see Section 5.3.2).

Information services

These provide access to resources targeted at

- specific learning outcomes, such as the Asian Studies web pages provided by Curriculum Corporation (see 5.3.2), or
- information of a particular type, such as the Tasmanian Cultural Images Project (see Appendix E).

Linkages between information services

via hyperlinks or resource discovery tools.

Collaboration and communication tools

These enhance student, teacher, and parent communication. For example, many of the surveyed information services provide email or web based forums for discussions related to the information they provide.

These networked learning services and tools rely on information technologies developed by projects within the Education Sector, the Cultural sector and the broader information technology community. Section 5.5 provides a detailed explanation of the technologies that influence the provision of networked learning services and tools in Australia. Briefly, the important technologies used in these tools and services are

Metadata descriptions of resources

Metadata descriptions enhance better discovery of resources by allowing more specific queries for resources, decisions to be made about resources without sighting the resources, and the sharing of evaluations (reviews) of resources. See Section 5.5.1 for more details.

Controlled Vocabularies

Controlled vocabularies are used to ensure consistent use of language within metadata descriptions. Controlled vocabularies allow Education communities to more effectively understand each other's resource descriptions. See Section 5.5.2.

Resource Packaging Technologies

These technologies deliver online content to the desktop and allowing reuse and repackaging of that content. See Section 5.5.4.

Harvesters, Databases, Search Engines and Database Access Protocols

These tools collect and organise metadata descriptions about networked resources and make them available for searching online. See Section 5.5.3.

Sections 5.3 and 5.4 of the report describe important education and cultural sector projects that are developing networked learning resources and the technologies for the next generation of networked learning resources. Important education projects identified in Section 5.3 include

- **Instructional Management Systems (IMS)** that aims to produce an Internet architecture to facilitate learning. This project is examining metadata, resource packaging and learner profiling technologies. It is also investigating technologies that allow the integration of the applications used to run an education organisation.
- **Schools Interoperability Project** that aims to produce software standards that allow communication and interoperability between education instructional and administrative software.
- **Education.Au projects** that aim to improve access to Australian networked learning resources. Education.Au runs the EdNA online directory of resources and manages the EdNA metadata set for describing networked learning resources. EdNA is currently examining new metadata harvesting and database access technologies and more effective online collaboration and communication tools.
- **Curriculum Corporation** that produces information resources aimed at specific system learning outcomes, maintains the SCIS database of catalogue records describing physical learning resources, and maintains the SCIS thesaurus - a controlled vocabulary for describing the subject of Australian learning resources.

Important cultural sector projects identified in Section 5.4 include

- **Consortium for the Interchange of Museum Information (CIMI)** who are developing best practice guidelines for describing cultural artefacts using metadata and who are also investigating the exchange of this metadata using standard protocols.
- **Australian Government Locator Service (AGLS) Project** that is part of a long term plan to provide a single online entry point to government services and information. This project has produced a metadata standard and guidelines for describing Australian Government information.
- **Zavier and MoV** that are piloting unified online access to Victorian cultural materials using a unified metadata standard and database access protocols.

4.2 Opportunities for Improvement, Recommendations, and Implications

The Australian education and cultural sectors are making good use of current technologies to provide innovative networked learning resources. Indeed, some of the Australian projects described in Section 5 are leading the way in the development and deployment of new networked learning technologies. There are, however, still political and technical barriers that are preventing optimal use of networked learning resources within schools. This section

- makes a number of observations regarding these barriers,
- makes recommendations for overcoming these barriers,
- provides broad strategies for implementing those recommendations, and
- analyses the implications of the recommendations for Australian education organisations.

It should be noted that Australian education organisations such as Education.Au and Curriculum Corporation already have policies and projects addressing the issues covered by a number of these recommendations. The challenge for EdNA SAG is to ensure that the needs of the school sector are well represented in this work.

Research conducted as part of this consultancy reveals a common acknowledgement from key stakeholders that the level of content development and activity (see table of initiatives in Appendix E) and expenditure across all States has reached a point of "critical mass" where collaboration to establish processes and protocols for information exchange and sharing is imperative.

Strategies to support this information sharing and exchange must be taken forward in two major areas, within the EdNA collaborative framework:

- a strategy for improving access to high quality networked learning resources that fits within an overall strategy for the effective integration of information and communications technologies into teaching and learning in all Australian schools
- A strategy for development of technical solutions to support improved location, sharing and exchange of networked learning resources.

Within these strategies, consideration should be given to marketing and support for behavioral change among the key stakeholders.

4.2.1 School use of Networked Resources

Problems related to overlapping projects, duplication of content development and online activities at a State or local level have limited the efficiencies afforded by a networked learning environment. Specific development contexts have also limited the degree to which resources have been effectively shared between States. Furthermore the volume of school based content developed for the web either by external organisations or by school systems or schools themselves is vast and often difficult to track. Another inhibitor to sharing projects and online curriculum content between schools, systems and cultural institutions lies in the difficulty that many have in defining the specific qualities and characteristics of individual resources.

Factors that have contributed to these restrictions to an integrated network environment include:

- a lack of collaborative processes to facilitate the implementation of a National strategy for the development of network learning resources
- incomplete resource identification, location and retrieval procedures
- fears regarding the capacity of National collaborations to adequately reflect local priorities and learning outcomes.
- limitations in available technology (hardware and software) within schools and the ability to update centralised information sources to support a decentralised network learning resources strategy.

In order to support the development and access to networked learning resources the following recommendations and strategies are made.

Recommendation: Build on and extend current use, integration and sharing of Network Learning Resources in Australian schools.

Strategies:

- Support collaborative projects that involve decentralised input and interaction with networked learning resources
- Establish agreed online development environment for school based resource development which is as far as possible platform independent. That is, not limited to proprietary software products.
- Continue to promote and market networked learning resources for use at school level together with providing professional development and support to achieve changes in classroom practice.
- Develop information technologies for networked learning resources which relate to Australian curricula and which can be defined in terms of local learning outcome statements.

Recommendation: Improve national collaboration and awareness of Network Learning Resources and reduce duplication of effort across systems.

Strategies:

- Establish a collaborative forum which includes EdNA SAG, the CESCEO Curriculum Group, and Curriculum Corporation whose brief is to establish agreed strategies for the professional development, marketing and prioritising of projects which extend the use of networked learning resources within Australian schools.
- Support and encourage projects that reuse and enhance existing networked learning resources to meet local curriculum needs rather than reinventing infrastructure. This can be achieved through
  - Prioritising projects that adapt existing infrastructure to specific curriculum needs.
  - Develop joint projects between key education stakeholders, cultural Institutions and other information providers that meet specific local curriculum needs.
  - Provide advice to systems on how to modify national networked learning resources to meet specific curriculum needs. Provide staff and financial support to aid reuse of these National resources within systems.
  - Encourage projects that use personnel from a number of systems as an aid to raising awareness within those systems.
  - Develop a national professional development and marketing strategy for nationally agreed networked learning technologies (e.g. the EdNA metadata standard).

The list of current and planned networked learning initiatives in Appendix E is an important deliverable from this consultancy that can be used to identify best practice and co-ordinate overlapping networked resource initiatives. It does not, however, provide an exhaustive or maintainable list of networked learning initiatives within Australia. Technologies already deployed in the Australian education community for discovering and cataloguing networked learning resources (such as metadata, harvesters, databases etc) are also be applicable to discovering and cataloguing networked learning initiatives.

Recommendation: Track important system and school level networked learning initiatives. Coordinate overlapping initiatives, and make the results of local initiatives available on a National level where applicable.

Strategy:

- Investigate applying existing resource discovery and management technologies for tracking and discovering networked learning initiatives. This may involve extensions to the EdNA metadata standard to allow description and identification of initiatives along with other categories of networked learning resource.
- Use collaborative forums to coordinate overlapping networked learning initiatives and publicise the results of important best practice networked learning initiatives.

Implications for Stakeholders: The above recommendations require modification of existing stakeholder strategies and processes to include more emphasis on communication and co-ordination of efforts with others.

4.2.2 Tracking and influencing standards

Networked learning resources are more easily shared between systems when they conform to information technology standards. Section 5.5 below mentions many National and International standards that are relevant to online provision of Learning Resources. Unfortunately, tracking and influencing International and National standards can be expensive and time consuming.

Recommendation: EdNA SAG should encourage tracking and influencing of relevant information technology standards.

Strategy:

To save costs with respect to tracking relevant information technology standards the EdNA SAG should

- partner with bodies that already track and influence relevant standards, and

- ensure that the deliverables for new networked learning resource projects include tracking, influencing and reporting on relevant standards.

Implications for Stakeholders: This recommendation formalises of the role of large collaborative organisations like Education.AU and Curriculum Corporation in tracking and influencing standards. Mechanisms must also be put in place to allow smaller organisations to influence standards via these collaborative organisations.

4.2.3 Simple User Oriented Technologies

In an online environment, the people and organisations creating resources, describing resources so that they can more effectively discovered and managed, and end users of resources are widely distributed and have varying levels of local support and expertise. For this reason, technologies must be easy to use and take into account any common background amongst users.

In particular, this consultancy identified that metadata entry tools and search tools need to be better tailored for use by the education community. Technologies showing potential to allow this tailoring include:

- controlled vocabularies for improving both metadata entry and search interfaces, and
- user and group profiling technologies that allow tools to be tailored to the needs of an individual or group.

Recommendation: Establish projects to investigate tailoring of software tools to the needs of education users.

Strategy:
The projects should at least investigate how to improve metadata entry tools and resource searching interfaces using:

- controlled vocabularies, and
- user and group profiles.

Implications for Stakeholders: New user oriented technologies would require major redevelopment of existing tools. The cost of this redevelopment could be justified by the potential for greater use and deployment of networked learning resources. Stakeholders should track developments in the IMS project with regard to profiling learners.

Note: Education.Au is currently planning and involved in projects investigating some of these issues.

4.2.4 Subject Vocabularies

A number of controlled languages are being used in Australia to describe the Subject of Networked Learning resources (e.g. SCIS, Library of Congress, and PICMAN described in Section 5.5.2). A unified subject classification system for Australian learning resources would have a number of advantages in terms of interoperability between systems and standardisation of search interfaces. There are, however, many issues related to such a thesaurus that require further investigation, as indicated in the following recommendation.

Recommendation: Establish a project to investigate the feasibility of a single controlled vocabulary for describing the subject of Australian networked learning resources.

Strategy:
The project should address:

- controlled vocabularies and thesauri currently being used to describe subject information of Australian learning resources,
- the feasibility or otherwise of a single Australian education subject thesaurus,
- issues related to the costs of constructing and maintaining such a thesaurus,
- implications that use of such thesaurus would have with respect to discovery of information not described using the thesaurus

If a single subject thesaurus is not feasible, the project should make recommendations with regard to

- selecting the best subject thesaurus for a given situation,
- ensuring effective discovery of information in an environment using multiple subject thesauri.

Implications for Stakeholders: A unified subject vocabulary would enhance interoperability between systems and allow standardisation of search interfaces. A unified vocabulary could be costly in terms of potential change for many well-established technologies and processes.

4.2.5 Sharing evaluative metadata

Many systems recognise that assessing resources with respect to learning outcomes and providing system specific reviews of resources would allow better teacher assessment of resources. This information is difficult to share across sectors (see Section 5.3.1) due to

- distrust of evaluative descriptions created in other systems,
- unwillingness to share local evaluative descriptions because these descriptions are a valuable local asset, and
- lack of a standard vocabulary for describing learning outcomes.

Recommendation: Establish a project to investigate sharing of evaluative metadata between systems.

Strategy:
The project should investigate:

- political barriers to sharing evaluative metadata,
- technical solutions to overcome some of the political problems, such as tagging evaluative metadata to indicate the system for which it is intended,
- a common learning outcome vocabulary or a mechanism that can translate between individual system learning outcomes.

Implications for Stakeholders: Evaluative metadata is difficult and costly to produce. This means that stakeholders can reduce costs if they more effectively share evaluative metadata. Producing a national standard for learning outcomes will, however, be a difficult task.

4.2.6 Coordinating Metadata Extensions

The EdNA metadata standard provides the basis for unified description of Australian networked learning resources. Metadata standards must be flexible enough to allow local extensions that meet local requirements. When two groups independently create extensions that meet similar goals, these extensions lead to duplication of effort. This duplication of effort can be minimised if extensions are coordinated through a metadata registration authority (see Section 5.5.1).

Recommendation: Establish an education metadata registration authority and to track and coordinate extensions to the EdNA metadata standard.

Strategy:
This authority can

- coordinate extensions that achieve the same goal,
- incorporate common extensions into the common metadata standard,
- provide translations between local uses of the common metadata standard.

Implications for Stakeholders: This recommendation formalises a role already undertaken by Education.AU.

4.2.7 Unified Searching for Learning Resources

Currently, discovery of learning resources can involve the interrogation of a number of resource databases through a number of separate interfaces. For example, in Australia, the SCIS database provides descriptions of physical learning resources and the EdNA directory of resources provides descriptions of networked learning resources. This means that any detailed search for Australian learning resources would involve separate searches of these databases. To overcome this, both of these databases are starting to catalogue resources traditionally catalogued in the other database. For these

reasons, a number of stakeholders have indicated that integration of the EdNA directory of resources and the SCIS database would be desirable. In conjunction, these two databases would provide access to valuable descriptions of a large number of Australian learning resources. There are, however, technical and cultural barriers to the integration of these databases related to their different cataloguing practices and technologies. EdNA is based on a simple resource discovery metadata set deployable within web pages whereas SCIS is based on more detailed traditional library standards such as Dewey Decimal Classification, SCIS subject headings and the MARC encoding format.

Recommendation: Investigate the unification of the SCIS database and the EdNA directory of resources.
Strategy:
Investigate unification based on

- harmonisation of the cataloging standards and technologies used in both databases, or
- unification via a common search interface which hides the differences between the databases (see next recommendation).

Cultural institutions, governments, environmental organisations, and commercial information providers all provide important networked learning resources and metadata about networked learning resources. Current search engines that aid discovery of Australian networked learning resources, do not, however, make use of all this metadata. Additionally, as described above there are a number of Australian metadata databases that provide descriptions of networked learning resources (e.g. EdNA directory of resources and SCIS database).

There is much Australian expertise related to searching and integrating results from multiple metadata databases within projects such as EdNA, BEP, Zavier, MoV, and institutions involved in the CIMI project See Sections 5.3 and 5.4 for details of these projects. This experience shows that it is possible using today's technology to produce a unified engine that searches for learning resources from separate domains and from separate metadata databases.

Recommendation: Build a unified searching system for discovering networked learning resources referenced in both education and non-education institutions, such as cultural institutions, governments, environmental organisations, and commercial information providers.

School based searching for networked learning resources often involves use of the local library catalogue, possibly combined with a search for external materials using a networked tool such as SCIS or the EdNA directory of resources. It would obviously be desirable to have classroom access to a unified search tool that could access local school databases such as library catalogues and CD-ROMS as well as external databases. This is difficult for two reasons:

1. Local databases such as the local school library catalogue are not usually made available for network access outside of that school. The means that any unified search tool must be hosted and run within a school, or that the local databases must be made available to the broader networked community so that an external unified search tool can access them.
2. Local databases vary widely in implementation and interface and rarely comply with information access standards. Unified search tools can only be built to interact with a limited number of database interface types. For this reason, unified search tools rely on standard interfaces to the databases they access.

It was outside the scope of this consultancy to determine the scale of these problems within Australian schools. However, many of the key stakeholders consulted identified that unified access to local and global databases from within a school was of critical importance for improved access to networked learning resources.

Recommendation: Investigate the feasibility of building unified search tools that can access local school as well as global networked learning resource databases.
Strategy:

- Investigate the diversity of local networked learning databases within schools.
- Examine the potential for these databases to be made accessible using standard information protocols.

- Examine the potential for these databases to made available outside their school environment, or the potential for schools to host and run its own unified searching tool.

Implications for Stakeholders: The unified searching mechanisms recommended above will allow easier and broader discovery of networked learning resources. Australian expertise and experience in unified searching should be exploited to build cross-domain search infrastructure that can be used by the education community.

Simultaneous searching of global and local school databases will be difficult and costly due to the diversity of databases used within schools. Many stakeholders, however, see this as a key requirement for future networked learning environments.

4.2.8 Sharing and Reuse of Course Materials

There is growing interest in using technologies such as XML for packaging course materials so that they can be easily shared and modified to meet new requirements. Internationally, the IMS project is investigating these issues. In Australia, broad-based interest in the IMS coalition is being led by the Commonwealth Department of Education, Training and Youth Affairs (DETYA), which has become an investment member. The EdNA initiative provided the impetus for DETYA's involvement and there is significant interest within the EdNA community to ensure that this project works to national education benefit. Curriculum Corporation has also planned a series of projects to investigate more effective packaging of learning materials. Both Education.Au Limited and Curriculum Corporation recognise that to achieve results, any project in this area must be done in a National collaborative context.

Recommendation: Consider a project to investigate resource construction and sharing technologies that allow:

- **collaborative construction of networked learning resources, and**
- **easy repackaging and reinterpretation of networked learning resources to meet new requirements**

Implications for Stakeholders: Effective repackaging technologies would allow a reduction in the overall cost of the production of networked learning resources that meet local curriculum requirements. This saving would have to be weighed against the extra cost of producing reusable resources and training users to repackage resources.

Any such project would be investigating leading edge application of technologies that are still under development. For this reason, the project would be large and high risk, but could reap enormous benefits with regard to more effective reuse of networked learning resources.

A major barrier to effective sharing of networked learning resources is the lack of technologies and infrastructures for protecting the rights of the authors and custodians of those resources. There are many large international projects investigating electronic commerce and rights management infrastructures (e.g. INDECS project, 1999). There are also too many issues related to e-commerce and rights management to be covered in this report. For this reason, it is difficult to make specific recommendations regarding Australian use of such technologies.

Recommendation: Establish a project to

- **identify electronic rights management and electronic commerce issues with regard to sharing networked learning resources in Australia,**
- **track and inform existing rights management and e-commerce projects of the needs of the Australian education community with regard to electronic commerce and rights management.**

Implications for Stakeholders: Wider deployment of commercial networked learning resources may result from technologies that protect the rights of publishers and authors.

5 Networked Learning Initiatives

5.1 Definition of Networked Learning Resources

Many respondents to the survey mentioned that the definition of networked learning resources was vague. However, one respondent cautioned defining networked learning resources

> "as fitting into the traditional genre of *resources-based learning*. This is because in an online environment resources include:
>
> - Curriculum content - via information retrieval & resource discovery
> - Support materials - via information retrieval & resource discovery
> - Opportunities for engagement with others (students, teachers, administrators, technical advisers, mentors, ...) - i.e., opportunities for communication
> - Exposure to networks through hyperlinks - i.e., the online digital medium is a resource in itself."

The initial project brief defined networked learning resources as including:

> "... all information resources accessible to students and teachers via networks at school or at home. These include Internet accessible resources, materials accessed via a school LAN or Intranet (including school library catalogues those stored on CD-ROM), commercial information services, on-line directory services."

This definition encompasses resources that derive from outside the education sector, acknowledging that developments within the education sector have been matched by similar interests and explorations by cultural institutions, governments, environmental organisations and commercial information providers. Many of these sectors are major suppliers of information to the education market. The education sector in turn provides information to some of these sectors. For these reasons, best practice use of networked learning resources must be influenced by the use of Networked Resources outside the Education sector.

5.2 Vision for Networked Learning Resources

Learning technologies, as essential tools for teaching and learning, have been embraced by the k-12 education sector at both a National and State system level as well as increasingly by local school communities. Initially most of the development and investment in networked learning resources was made in the establishment of information technology infrastructure and acquisition of hardware and software. More recently teacher professional development and classroom practice have received considerable attention. Educators throughout Australia have been exploring strategies for the effective use of learning technologies to improve student outcomes, enhance curriculum development and improve teacher expertise in the use and integration of learning technologies within the classroom.

The survey identified that there is substantial agreement on the long tern vision for networked learning resources within the k-12 education sector.

Student Learning

Networked Learning resources will improve student learning through:

Quality Content

- Providing access to a wide range of quality resources without the constraints imposed by the availability of physical collections in schools
- Delivering broader curriculum offerings for students
- Providing resources in a wide range of formats : text, multimedia resources, discourse with authors, experts and peers, case-study or exemplary materials, simulations
- Assisting in the development of critical information literacy skills and strategies
- Increasing the amount of local and focussed content, and thus improving the quality and relevance of the content

- Harnessing the resources of heritage collections and research databases thus creating a bridge between classroom experiences and national culture.

Classroom environment

- Providing geographically independent learning experiences
- Supporting open-ended inquiry based learning
- Encouraging greater engagement and motivation in students through student directed learning experiences
- Linking resources to specified learning outcomes and priorities
- Enabling teachers to support studonts to access information – rather than seek to provide it.
- Enabling students to analyse their work more easily and to process and produce better work.

Collaboration

- Delivering new options for collaboration and co-operation at local, State, National and Global levels
- Integrating multiple information sources through standards, protocols and the automation of systems
- Capitalising on value-adding by others thereby creating a more focused and useable resource base and preventing duplication of effort.

Customisation

- Offering students greater control over their learning environment
- Developing a learning environment which can cater for individual learning styles
- Delivering customised information e.g. updates to user on nominated topics via "Push" style interface
- Searching via a "one button search' of key content and metadata repositories.

Support

- Improved administrative support for students, parents and teachers through access to school related networks.

Teacher Support

Furthermore networked learning resources are perceived to offer considerable opportunities for teacher professional development and curriculum design. Specific attributes include:

Accessibility

- Professional development independent of geographic location and delivered where and when the teacher wants it.
- Access to and interaction with worldwide research and leading practitioners
- Providing opportunities and access to good practice online from different state systems
- Ability to share knowledge and resources with colleagues having similar professional interests, teaching roles

Content

- Ability to access, enhance and create resources from an Australian perspective.
- Accessing a searchable resource database containing exemplars of lesson plans across all areas of the curriculum which provides illustrative models of implementation strategies in a range of learning contexts. These can be complemented by associated discussion opportunities to expand issues arising from components of curriculum or technology arising from the case studies.
- Searching using a "one button search" which encompasses professional development materials as well as source materials.

Collaboration

- Ability to share and contribute to networks of common interest
- Reduction in preparation time as duplication of materials can be distributed electronically

Customisation

- Providing self paced 'guided tutorials which allow teachers to participate in their own time and revisit when necessary
- Providing prompt individual feedback and often individually customisable learning experiences
- PD can be incorporated into teachers' existing work practice with monitoring and mentoring services occurring when the learner requires assistance

Support

- Greater access to mentors and peer support in out of school hours
- access to immediate, responsive curriculum and technical support to enhance integration of technology into existing teaching practice - trouble shooting model.

5.3 Major Education Initiatives

5.3.1 EdNA

EdNA (Education Network Australia) is a collaboration between all Australian education sectors and systems in relation to the use of information technology in education. The Education and Training Ministers within Australia fund Education.Au to implement the functions of the network, primarily through management of the EdNA Online service. EdNA Online is a website that aggregates online educational resources for the whole education and training community and adds educational value to them in a variety of ways.

EdNA is a network of Australian education resources in many senses.

- Through the formal EdNA structures all Australian education systems and sectors discuss, and often reach consensus and provide advice to governments on issues relating to the use of information technologies in education. The network is therefore a resource to governments.
- EdNA Online provides numerous opportunities and tools to support online networks within the education community. These are provided through such things as discussion groups, noticeboards, news services (such as *What's New*, *News and Views* and *New in Early Childhood* and information pages like *Child Safety and the Internet*. The tools of discussion group administration, Search API, noticeboards are provided to any bonafide member of the education community to develop further networks in, for example, professional associations, cross-sector interest groups or regional interest groups.
- EdNA Online provides a directory of 8400 evaluated items contributed by stakeholder groups with whom Education.Au Limited has service agreements. From these items a further 242 000 sites are indexed, providing a substantial resource (8400) of networked items that can be searched and browsed and a very significant (242 000) resource that can be searched. Significant value has been added to the core items by the addition of metadata that facilitates searching by categories such as user level.

EdNA has a philosophy of enhancing access to networked learning resources by building distributed Internet frameworks that allow grass roots input rather than centralised solutions. This philosophy is captured in the following response to a major ASTEC Report, which is where the concept for EdNA was first foreshadowed:

> "The continuing development within AARNet, the development of other on-line service providers and various other Commonwealth, State and Territory initiatives, is giving rise to a dynamic "community of networks" through a bottom-up user-driven approach, which is responding to opportunities and the demands of particular sectors and communities. This community of networks is characterised by devolution of control, and leaves the way open for creative ideas to emerge from various communities of interest. Nevertheless, Internet will continue to be a key part of the national information services infrastructure. It would be unwise in such a climate to adopt a centralised approach, albeit one in which a range of interested parties are involved, to manage the development of "the national information network". There is a risk that a centrally driven approach would result in the government being locked into inappropriate technologies or services, while the market moves in other directions."

(ASTEC 1994).

The EdNA directory of resources is an example of the success of this philosophy. Approved submitters from anywhere using a web entry form can update this directory. It can also be searched from anywhere using a World Wide Web interface.

Future EdNA Projects

EdNA is undertaking and planning a number of projects relevant to this report (EdNA Online 1999), including:

- *Automated Harvesting*. Initially the EdNA directory collected information via distributed updates by a web form and via an automated indexing function that indexed sites linked from sites already in the directory. The "Automated Harvesting Project" is upgrading the automated indexing function to
  - understand EdNA metadata embedded within stakeholder's web documents
  - extract EdNA metadata from repositories (databases) managed by stakeholders
  - address issues related to the collection of multiple metadata descriptions of the same resource from multiple repositories.
- *Interactive Services*. This project is investigating issues related to building online communities by expanding on the Interactive Services it provides, perhaps to include real time interactive services such as chat sessions.
- *Metadata*. This project is examining the impact and possible use of recent metadata technologies in the EdNA directory. Issues being investigated include:
  - interoperability with other metadata communities,
  - use of XML and RDF to encode metadata
  - repository versus embedded metadata models
  - investigating better interfaces for helping users create and edit EdNA metadata

EdNA Evaluative Metadata

The EdNA metadata standard (EdNA Metadata Homepage, 1998) extends the Dublin Core metadata set with ten elements for describing Australian learning resources (see Section 5.5.1 for details). Some of these elements are used to give evaluations of the resource with respect to their appropriate use and pedagogic value. There has been some anecdotal evidence that some stakeholders have issues with these evaluative aspects of the EdNA metadata standard, including

- mistrust of these evaluative descriptions because they may be made within another school system and so are not locally relevant,
- unwillingness to share local evaluations because these descriptions are a valuable local asset,
- no standard vocabulary for describing the quality of a resource with respect to specific school goals.

The EdNA metadata project is investigating technical approaches to alleviating the first two of these problems. By using metadata qualifiers being investigated in the Dublin Core community, stakeholders will be able to tag the evaluative metadata to indicate which system added the information. These tags will allow others can then make a more informed judgement about the appropriateness of a resource for their teaching and learning goals.

The EdNA development community is also aware that a standard for describing resources with respect to learning outcomes would greatly enhance sharing of learning resources and allow better evaluation of those resources by teachers.

5.3.2 Curriculum Corporation

Like Education.Au, Curriculum Corporation is an independent education support organisation owned by all Australian State, Territory and Commonwealth Ministers of Education. The Corporation's purpose is to facilitate collaborative curriculum development among school systems by initiating projects and by responding to demand. It was established to:

- support agreed curriculum priorities
- achieve economies of scale
- avoid overlap and duplication of services among the Commonwealth and the eight States and Territories.

Curriculum Support Materials

Curriculum Corporation produces and provides quality-controlled networked learning resources targeted at helping teachers develop courses. These are general resources, focusing on particular curriculum areas that are nationally applicable across school sectors (e.g. science and technology, Asian studies). The resources consist mostly of web materials such as teacher manuals, pointers to related resources, etc. Some resources also provide communication and network building mechanisms such as e-mail lists and discussion groups.

Course and Career Database

Curriculum Corporation also provides materials relevant to careers advisers via the OZJAC database. OZJAC contains information on all accredited courses in Australia, links courses to jobs, and jobs to industry, with explanations of new concepts used in education, training and the labour market.

SCIS

Curriculum Corporation maintains Schools Catalogue Information Service (SCIS) - a database of catalogue records describing educational materials such as books, audio-visual materials and computer programs. This database is large (600 000 records) and growing at around 3000 records per month. Because it is a shared resource, SCIS reduces the cost and duplication of effort required by teacher librarians in cataloguing resources in schools.

To enabled better subject classification of education materials, Curriculum Corporation have developed the SCIS thesaurus - a subject classification system containing Australian terms.

Future Projects

Curriculum Corporation continually runs projects to produce new online curriculum support material as demand is identified.

Of particular relevance to this report is a Curriculum Corporation proposal for a series of projects investigating a framework to allow the collaborative construction, delivery, use and reuse of online learning resources. These projects overlap with many of the issues highlighted in this report including:

- identifying and evaluating existing effective resources
- investigate extending the EdNA metadata standard to aid collaborative construction and delivery of resources
- define and track standards for submitting, storing, networking and accessing online education resources
- copyright and intellectual property management
- flexible data systems such as XML for storing online education resources
- user interface issues
- pedagogy for online resources

Such projects obviously overlap with similar projects within IMS and EdNA.

Curriculum Corporation and Education.Au have also been discussing possible future use of EdNA within the SCIS environment and the use of SCIS Subject Headings as the basis for an EdNA subject thesaurus.

5.3.3 Instructional Management Systems (IMS)

IMS is a global coalition of academic, commercial and government organisations that aims to define an Internet architecture to facilitate learning. It is developing technical specifications in three main areas:

- Description and packaging techniques that allow discovery and reuse of digital resources.
- Tools for managing and tracking learner progress through course material, profiling learners, and allowing course material to adapt to learner profiles.
- Integrating the applications associated with running an education organisation.

IMS use a precise definition for networked learning resources outlined by the IEEE (IEEE 1998):

Learning Objects are defined here as any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning. Examples of technology supported learning include computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, and collaborative learning environments.

Examples of Learning Objects include multimedia content, instructional content, learning objectives, instructional software and software tools, and persons, organizations, or events referenced during technology supported learning.

IMS Metadata

One of the first public outputs from the IMS was a metadata specification for describing learning resources. IMS metadata has a broader focus than Dublin Core and EdNA, including elements to facilitate management and use of online learning resources as well as discovery. The specification supports elements for facilitating security, privacy, commerce, and evaluation of resources. These elements are not prescriptive about how these facilities should be implemented. Instead the elements provide placeholders for future implementations of these technologies. This is wise given that there is much development within the broader information technology community with respect to security, privacy and e-commerce issues.

The metadata elements within the IMS specification related to resource discovery have recently been harmonised with the Dublin Core initiative. This means that there can be some level of future interoperability between IMS systems and systems that use Dublin Core or one of its derivatives specifications such as EdNA.

Future IMS Work

IMS is planning to release specifications for learner profiles, packaging of networked resources and integration of education management software. These are all important technologies for the future of networked learning resources and should be closely tracked by interested Australian initiatives.

5.3.4 Schools Interoperability Framework

The Schools Interoperability Project (SIF) is a software industry initiative to create an open standard for ensuring interoperability between K-12 instructional and administrative software. The effort was initiated by Microsoft and includes important vendors of education software and representatives from North American schools and education administrations.

The standard will define common data formats and architectures for exchanging education information between software applications using XML. It is hoped that the initial specification will be produced by the end of 1999 with rollout of conforming products in third quarter 2000.

The SIF whitepaper (SIF, 1999) acknowledges the importance of existing standards in this area. In particular it intends to be informed by the IMS work on managing and discovering networked learning resources. The whitepaper does not, however, mention the work of IMS with regard to learner profiles, packaging of digital resources or integration of software applications. This may lead to future interoperability problems.

Although SIF is initially only focussed on solving North American interoperability issues the involvement of major software vendors means that it is relevant to future Australian networked learning initiatives and should be tracked by interested parties in this continent.

5.4 Cultural Agency and Government Initiatives

5.4.1 CIMI

The Consortium for the Computer Interchange of Museum Information (CIMI) aims to increase the audience for museum information through the use of open standards for the management and delivery of digital museum information. They have several projects but two of particular interest are the CIMI Dublin Core Metadata Testbed and the CIMI Z39.50 Interoperability Testbed.

The Dublin Core Testbed project commenced in 1998 to evaluate Dublin Core as a means of improving resource discovery for museum resources on the web. The project is now developing best practice guidelines for the use of Dublin Core to describe museum artefacts, investigating the use of RDF (an XML based language for describing metadata) as a metadata exchange method. The final report is due in December 1999.

The first stage of the Z39.50 Interoperability Testbed project was completed in 1997. The project produced an application profile that detailed Z39.50 search and retrieval specifications for use by museums and other cultural heritage information centres. Current work centres on the searching of Dublin Core metadata.

These projects, together with others, are laying the foundations for CIMI's proposed Virtual Museum project where the focus has moved from improving search and retrieval to transforming data into educational experiences for the user.

5.4.2 AGLS and BEP

The Australian Government Locator Service (AGLS) initiative (Office for Government Online, 1997) is part of a long term plan of the Australian Government to provide a single government entry point to all levels of government services and information. In order to provide seamless access across a huge variety of resources the AGLS standard for metadata (National Archives of Australia, 1998) was established. AGLS extends the 15 key elements of Dublin Core to provide 2 extra elements suited to management and discovery of Australian government resources.

The AGLS standard is demonstrated in the federal government's Business Entry Point (BEP), a site which integrates resources from the Office of Small Business, AusIndustry, and federal Treasury agencies, in consultation with State governments (Australian Federal Government, 1999a). The site provides guidelines for using AGLS to describe business resources (Australian Federal Government 1999b).

5.4.3 Zavier and MoV

Zavier, the "Z39.50 Arts Victoria Interoperability Project" is a pilot project to establish a single entry point to a diverse range of distributed Victorian cultural databases.

> *The aim of the project is to be able to search across a range of distributed cultural agency databases, and deliver an on-line sample of multi-agency source content, as an example of how interoperability between heterogeneous databases can be achieved using Z39.50.* (Arts Victoria, 1999).

The Zavier system facilitates access to a number of cultural agency databases by providing a web based gateway that uses Dublin Core and the Z39.50 protocol to communicate with the individual agencies' servers. The system integrates information from: Museum Victoria, State Library of Victoria, National Gallery of Victoria, Performing Arts Museum, Cinemedia, and Public Record Office Victoria.

The Zavier project led to the development of the ZedMov pilot. This was developed as an internal Z+SQL testbed (Distributed Systems Technology Centre, 1999e) in cooperation with the Museum of Victoria and consists of two phases. Z+SQL is an extension to the Z39.50 profile to allow SQL queries of underlying databases. This work has also led to DSTC's participation in the International Interoperability Testbed for Z+SQL. Other Australian participants in the educational sector include

- Department of Education of Tasmania, Australia
- Museum Victoria, Australia
- National Gallery of Victoria, Australia
- State Library of Victoria, Australia.

5.5 Information Management Tools and Standards

This section discusses general networked information techniques that are being used to deliver networked learning resources. Some of these techniques are adaptations of traditional information management techniques to the networked environment. For example, metadata and controlled vocabularies are both library science techniques that have been adapted to the networked environment.

5.5.1 Metadata

Metadata is structured data about data that can be used for many tasks:

- aiding users to discover the data
- allowing users to determine if the data is what they want
- mediating access to the data (e.g. preventing some users from accessing data)
- facilitating retrieval and use of the data (i.e. where do I go to get the data and how do I interact with it)
- helping decide which instance of the data should be retrieved (if multiple formats are provided).
- helping enforce the intellectual property rights associated with the data
- providing contact information about the data such as the custodian.
- indicating relationships with other resources (e.g. linkages to previous and subsequent versions, derived data, other data in a collection, and other data or programs that should be used with the data).
- managing the data (e.g. history of the data, archival requirements, destruction authority).

Simple examples of metadata include the "Properties" of a Microsoft Word document, or the catalogue record for a library resource.

The basic model used for metadata for networked resources is known as the "type and value" model. Metadata is represented as a set of facts about the resource (e.g. "Title", "Author"). Each fact is represented as an element. An element contains a type (which identifies what information the element contains) and one or more values (the metadata itself). For example, Metadata embedded within the EdNA web page http://www.edna.edu.au contains the elements "title", "publisher" and "subject" as shown:

Title	EdNA - Education Network Australia
Publisher	Education.Au Ltd, 178 Fullarton Road, Dulwich, South Australia 5065, tel: +61 8 8334 3210, fax:+61 8 8334 3211
Subject	EdNA, education, Australia, Education Network Australia, higher education, online education, vocational education and training, education departments, VET, adult, community education, private providers, online technology, education systems, universities, technical and further education, TAFE, educational institutions, schooling, organisations, colleges, metadata, peak bodies, associations, early years of schooling, middle years of schooling, society and environment

Metadata can be used to describe online resources (as above), physical resources such as books in a school library or even abstract entities such as events.

Many online communities are using metadata, which has led to the situation where a resource may be described by two (or more) sets of metadata attributes. These metadata descriptions may serve different purposes such as discovery metadata and rights management metadata, or they may serve the same purpose and come from different descriptive communities. Recognition of overlapping metadata standards has led to metadata harmonisation and standardisation efforts within online description communities.

Dublin Core

One area of agreement has been the standardisation of metadata for facilitating discovery of information. The Dublin Core metadata set (Dublin Core Metadata Initiative, 1999) is emerging as the defacto metadata standard for facilitating the discovery of both physical and online resources in a networked environment such as the Internet. One of the aims of the Dublin Core initiative is to facilitate interoperable discovery between online communities. Governments, geospatial information providers, libraries, museums and the education sector are all using Dublin Core to improve discovery of information within their communities. By using the same metadata standard these communities can also more easily discover each other's resources.

While basing their metadata descriptions on Dublin Core to enhance interoperability, each of these communities typically extends the metadata set with elements that meet their specific requirements. Dublin Core is designed to be extended in this way. Such extensions are intended to be understood by

the communities making the extensions and not by the broader Dublin Core community. For example, EdNA has developed a metadata standard (EdNA Metadata Homepage, 1998) that extends Dublin Core with ten elements for describing Australian learning resources. Some of these elements are used to manage the metadata within EdNA online, while others give *evaluative* or *value-add* descriptions of the resource with respect to their appropriate use. For example, the EdNA "UserLevel" metadata element gives an evaluation of the typical level of user for which the content would be most appropriate.

Dublin Core was originally developed to facilitate more effective discovery of networked resources. It should, however, be noted that it is currently being used in some domains to effectively describe both electronic and non-electronic resources. The success of Dublin Core in describing physical resources stems from the fact that the library community was instrumental in its development. The OCLC Office of Research and Special Projects currently hosts the Dublin Core Directorate. OCLC (Online Computer Library Center, Inc.) provides services to libraries around the world.

Metadata and Discovery

Descriptions that enhance discovery of resources are probably the most commonly known application of metadata. Metadata facilitates more effective discovery of online resources in a variety of ways, including:

- **Allowing more specific queries**. Searchers can express their queries in terms of the structure of the metadata. For example, metadata fields of "author" and "date" allow queries such as, "find resources published by Curriculum Corporation in 1999".
- **Allowing early decisions about resources.** A searcher can use a resource's metadata to decide whether it is appropriate, without sighting the resource.

Metadata beyond Discovery

The Dublin Core initiative represents broad cross community agreement on a metadata set to enhance a particular task – discovery of resources. A number of projects are pursuing similar metadata agreements for other processes important to online education including rights management, protection of intellectual property rights, and e-commerce. For example, the INDECS project (INDECS project, 1999) is an international initiative to develop metadata to support electronic commerce in intellectual property. To achieve its goals, the INDECS project acknowledges that e-commerce metadata must be integrated with other metadata such as Dublin Core and educational metadata.

INDECS is only one of many projects examining electronic commerce infrastructures. For this reason, it is difficult to make any predictions on the nature of future rights management and electronic commerce infrastructures. Nonetheless, projects such as INDECS should be tracked and informed by interested parties within the Australian education community.

Local Metadata Extensions

Different audiences within a metadata community may require different views of that community's metadata. For example, within the Australian education community, Victorian educators may wish to describe resources with respect to Victorian learning outcomes and Queensland educators may wish to describe the same resources with respect to Queensland learning outcomes. Such descriptions are only intended for educators within the respective states.

While these sorts of extensions support local information requirements they can lead to problems if the metadata is to be shared with others. For example, if Victorian and Queensland educators use the same metadata elements to describe their learning outcomes, it becomes difficult for other education sites to automatically determine if a resource is described in terms of Queensland or Victorian outcomes.

Metadata initiatives such as Dublin Core and RDF are developing *metadata qualification* mechanisms to allow identification of local extensions so that they can be distinguished and recognised by others. These qualifiers would allow, for example, a Queensland educator to determine that a resource has been described in terms of Victorian rather than Queensland outcomes. The Queensland educator may understand Victorian outcomes and hence can determine if the resource is useful in the Queensland context.

While support for local metadata extensions is essential for encouraging local use of metadata, registration of those extensions with an authority also has advantages. If local metadata extensions are registered, then the registering body can

- coordinate extensions that achieve the same goal,
- incorporate common extensions into the common metadata standard,
- provide translations between local uses of the common metadata standard

For example, a registry of Australian Education metadata might notice that Victoria and Queensland have similar requirements for outcome descriptions. The registering authority could then ensure that both states use the same metadata element to describe those outcomes. It could possibly also coordinate standardisation of national outcome descriptions, or (more realistically) create a concordance translating between the terms used by each state. Such a concordance could be used to build a software application that could automatically translate Victorian outcomes to Queensland outcomes and hence provide a Queensland educator with a local view of the Victorian metadata.

Metadata Creation Issues

Some metadata can be automatically extracted from electronic resources. For example, it is possible to automatically extract the title of a web page and add this to a metadata description. In general, however, computers are poor at producing metadata related to the meaning or use of a resource. This semantic metadata is best produced by human cataloguers. Hand creating metadata is obviously costly and time consuming. This means that it is difficult to produce metadata for every resource in online environments that are large and growing.

Online metadata communities address this problem in a number of ways:

- **Broadening and distributing metadata creation.** Some online communities have moved the creation of metadata away from professional cataloguers, allowing authors, publishers and even resource users (e.g. teachers in the education community) to describe resources. Distributed information infrastructures like the World Wide Web and e-mail make distributed resource description feasible and economical. The advantage of distributed resource description is that more resources can be described because more people are describing them. It has the disadvantage that the quality of the metadata is degraded when compared to metadata created by professional cataloguers.
- **Only describing important resources.** Although online environments are large, the quality of resources varies widely. This means that it is possible to lessen the metadata creation load by being selective about what is described.
- **Staging metadata creation.** Another way to reduce the cost of metadata creation is to produce less metadata for less valuable resources and to extend the metadata, as the resources become more important. This leads to chains of metadata creation – non-professional cataloguers (or machines) add simple metadata, and more complex metadata is be added by cataloguing professionals for valuable resources. A typical chain of creation might be:
  - first add location metadata to a directory of resources and automatically create a full text index the resource (if it is a document),
  - then add metadata related to the subject of the resource,
  - then add evaluative metadata related to the use of the resource (such as a review of the resource for a particular task).

All of these techniques are currently being used in Australian education community.

Although the above techniques do lessen the load of metadata creation and make it feasible in large online environments, they have the disadvantage that poorer quality metadata is produced by non-professional cataloguers. This issue can be addressed through education and training of the metadata creators, clear guidelines for metadata creation, and placing quality controls in the metadata creation process. A staged metadata creation process provides a good opportunity for quality controls to be put in place.

5.5.2 Controlled Vocabularies

Even if two communities agree on a metadata standard for describing their resources, they may not understand each other's descriptions because they use different values within the metadata elements.

Consistent use of language within metadata descriptions can greatly aid interoperability between metadata communities. Such consistent language comes from controlled vocabularies or thesauri. Some communities have agreed on and developed thesauri for describing information of relevance to them. For example, the SCIS classification system is widely used in Australian school libraries for describing the subject information of a resource such as a book.

A number of controlled vocabularies are being used to describe Australian education resources:

- The SCIS thesaurus contains subject classification terms applicable to describing Australian learning resources. The scheme is widely used in Australian schools to describe the subject of physical learning resources such as books.
- The PICMAN thesaurus developed by the State Library of New South Wales is being used to describe large image collections.
- The EdNA Metadata standard makes a number of recommendations for controlled vocabularies for use within its elements. For example, the EdNA Userlevel element should contain one of the values: "preschool", "primary", "lower primary", "middle primary", "upper primary", "secondary", "lower secondary", "upper secondary", "teacher", "student", "VET", "university".

Controlled vocabularies and Discovery

Controlled vocabularies can improve discovery of resources. Users can interact with interfaces that browse the controlled vocabulary until they find a term relevant to their need, and then search for all resources described using that term. For example, in the EdNA system, a user could browse the controlled vocabulary for the UserLevel element, decide the term "upper primary" is most relevant to their need, and find all resources that are targeted at upper primary students.

5.5.3 Metadata Infrastructures

Once a community has described their resources they will want others to use those metadata descriptions. There are many technical options related to creating, storing, communicating and accessing metadata. A good overview of options is available in the Australian Government Locator Service (AGLS) Manual for Users (Office of Government Information Technology & National Archives of Australia, 1998), section - AGLS Metadata Technical Management. In particular, the AGLS manual describes possible infrastructures for allowing access to metadata, including:

- Embedding the metadata within the resources being described and using the usual resource access protocols to simultaneously access both the resource and its metadata.
- Separating the metadata from the resource, storing it in a database (often called a metadata repository) and providing access to the database using a standard protocol such as Z39.50 or X.500.

Embedding metadata in the resource has the advantage that the metadata can be accessed using the technology used to access the resource. It is also easy to keep the metadata up to date – if the resource changes, then the metadata can be easily found and updated. Disadvantages of this approach are that it is difficult to describe resources that do not allow metadata to be embedded (such as images) and that the metadata cannot be modified without also modifying the resource. Separating metadata from the resource and storing it in a database overcomes these disadvantages, but does require significantly more investment in technology. Separating the metadata and the resource also has the advantage of allowing description of "third party resources", that is resources published by external agencies.

Z39.50 and X.500 are standard protocols specifying formats and procedures governing the exchange of messages between a client and server, enabling the user to search remote databases, identify records which meet specified criteria, and to retrieve some or all of the identified. Both are flexible standards that can be used to access most kinds of data, although they do have their biases. Z39.50 (Finnigan and Ward, 1997) was developed in the library community and is most appropriate for searching databases of catalogue (metadata) records. X.500 is most appropriate for accessing distributed databases containing personnel information.

These infrastructures are mentioned here because they are both currently being investigated in the Australian education community by the EdNA initiative (see Section 5.3.1).

Distribution vs Centralisation

Software applications that use metadata may access the metadata from a local centralised repository or a series of distributed repositories. Some of the advantages and disadvantages of each model are discussed below.

In the centralised model, the application maintains a single local database of metadata. The application updates this database by periodically retrieving metadata from remote sites or repositories (c.f. web crawling) or periodically being sent metadata to include in the database. This model has the advantage that access to the metadata by the centralised database is fast because it only involves a local database look up. It has the disadvantage that other distributed repositories of metadata must somehow replicate their data in the centralised repository if it is to used by the centralised application. If the local and centralised data formats differ then this replication can involve transforming the metadata into the format expected by the centralised application.

In the distributed model, the metadata is stored in distributed databases that are remotely accessed by the central application via some standard interface e.g. X.500, Z39.50. This model has the advantage that distributed repositories of metadata maintain custodianship of their metadata and are not required to replicate to a central repository. This model has the disadvantage that access to the metadata is slower because it is happening over a network.

Examples of these two approaches are widespread in the Australian education community. In its development of EdNA Online and in deployment of metadata, EdNA has adopted both approaches. In doing so EdNA recognises that metadata for online resources will always occur in both embedded (intra-document) and detached (repository) formats. The EdNA Online database of evaluated resources acts as a centralised collection - however, it also makes use of an indexing robot to provide further searchable items (increasing the searchable collection by about 30 times in number). Complementing this centralised database and index is the EdNA Harvesting project (see above), which is geared to aggregating value of metadata collections in distributed repositories as well as in harvesting (collecting and storing) items in its database which have been enriched with EdNA-compliant metadata. In contrast, the Zavier project (also discussed below) answers user queries by only accessing remote metadata repositories.

5.5.4 Text Markup Languages

HTML, XML and SGML are all standard languages that can be used to construct and share online resources.

HTML is the language used to create pages on the World Wide Web. HTML describes the structure of a multimedia document in terms of the logical layout of the document. For example, HTML allows the creator of a web page to identify headings, paragraphs, hyperlinks etc. in a web page. Web browsers interpret this description to layout the page for the user.

Although HTML is an important standard for creating online resources, it has limitations with regard to automated understanding of those resources. HTML does not describe the detailed semantics (meaning) of resources. It can identify a heading for a section, but not that a particular section is intended for teachers (for example). This means that it would be difficult to automatically tailor the resource to the needs of a teacher or the needs of a student by displaying only the appropriate sections.

XML and SGML are resource description standards that do allow semantic interpretation of resources. These languages allow a community to create a DTD (Document Type Definition) that describes how their documents should be structured. Documents conforming to a community DTD can then be understood in terms of the semantics of that structure. For example, a DTD for describing online learning resources might allow structure that identified sections intended only for teachers. This would make it possible to automatically extract those sections relevant to a teacher.

The example given above relies on all education resources using the same DTD. Getting community agreement on general structure of documents is a difficult consensus building task, but one that can have many benefits with respect to reuse, local modification and understanding of networked learning resources.

6 Acknowledgments

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7 About the Authors

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Dr Nigel Ward is a Senior Research Scientist at the Distributed Systems Technology Centre (DSTC Pty Ltd) based in Brisbane, Australia. He is a member of the Resource Discovery Unit that investigates technologies used in the discovery, access, and retrieval of electronic resources on the Internet. Nigel's work within the RDU has focussed on Internet protocols and standards for sharing and discovering information. In particular, he is well versed in the Z39.50 information retrieval protocol, and the Dublin Core metadata initiative. Nigel also has expertise in Software Engineering, Formal Software Specification and Refinement Techniques, Declarative Languages, and Object-Oriented Technologies.

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In her role as Director of Fankhauser and Associates, Rae has undertaken consultancy work across the broad educational, government and business fields, applying her expertise in information management, strategic planning and the development of information literacy. She is currently teaching in the teacher librarianship field at Monash University, in addition to undertaking long-term contracts with the Department of Education, and the Department of Justice. Her most recent publication is the well regarded resource, "Integrating Technology Enhancing Learning - a Teacher Resource Kit". Rae has also contributed to a number of library reference texts, the most recent being on strategic planning for the introduction of new technology in libraries and schools.

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Appendix A - Glossary and Abbreviations

ACE

Adult and Community Education

Australian Government Locator Service (AGLS)

The AGLS metadata standard is a set of 17 descriptive elements which Australian government departments and agencies can use to improve the visibility and accessibility of their services and information over the Internet. It is based upon the leading international online resource discovery metadata standard, the Dublin Core standard and the first version was developed in late 1997/early 1998. See http://www.naa.gov.au/govserv/agls/default.htm

CESCEO

Conference of Education System Chief Executive Officers

CIMI

The Consortium for the Computer Interchange of Museum Information aims to increase the audience for museum information through the use of open standards for the management and delivery of digital museum information.

EdNA

Education Network of Australia - the network of education stakeholders committed to improving education through the use of online technologies Also add Education.Au - the Ministerially owned company that implements the functions of EdNA, particularly the management of the EdNA Online service.

Education.Au

The company established by the Ministerial Council for Education, Training, Employment and Youth Affairs to implement the functions of EdNA. The company is charged with facilitating networks in the education and training community to promote the use of the Internet in education.

EVAG

EdNA VET Advisory Group

HEAG

Higher Education Advisory Group

Initiatives

Efforts to provide organised access to networked learning resources via local area networks on campus, via dial-up facilities from home and remote sites and via the Internet. These efforts should aim to allow improved student access to information relevant to their studies or to facilitate teacher professional development.

IMS

The Instructional Management Systems Project, an international Educom NLII initiative, is developing a specification and software for managing online learning resources. Learning resources can include people, educational service companies, content, tools, and activities. See http://www.imsproject.org/metadata/index.html

ISO

The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies.

LCSH

Library of Congress Subject Headings are a set of subject headings used by the international community as a controlled vocabulary for providing metadata particularly suited to library resources.

MCEETYA

Ministerial Council for Education, Employment, Training and Youth Affairs

NCEC

National Catholic Education Commission

NCISA

National Council of Independent Schools Association

Networked learning resources

Includes all information resources accessible to students and teachers via networks at school or at home. These include Internet accessible resources, materials accessed via a school LAN or Intranet (including school library catalogues and also catalogues stored on CD-ROM), commercial information services, on-line directory services" (Networked Resources in Schools Working Group, 1998).

NISO

The National Information Standards Organization is a United States body that develops and promotes technical standards used in a wide variety of information services.

RDF

Resource Description Framework (http://www.w3.org/Metadata/RDF/) is a standard XML syntax for communicating metadata descriptions. It is being developed by the World Wide Web Consortium.

SAG

EdNA Schools Advisory Group

SCIS

Schools Catalogue Information Service is a large database maintained by Curriculum Corporation that contains catalogue records describing educational materials such as books, audio-visual materials and computer programs. Curriculum Corporation has developed a controlled vocabulary for subject classification of education materials in SCIS, called the SCIS thesaurus.

SIF

Schools Interoperability Framework is an industry initiative to develop an open specification for ensuring that K-12 instructional and administrative software applications work together more effectively. SIF is not a product, but rather an industry-supported technical blueprint for K-12 software that will enable diverse applications to interact and share data seamlessly; now and in the future. See http://www.schoolsinterop.org/newsAndEvents.asp

VET

Vocational Education and Training

X.500

X.500 is a suite of ISO standard computer protocols for searching and updating distributed databases containing personnel information.

Z39.50

ISO and NISO standard computer protocol for searching and retrieving metadata from remote databases.

Appendix B - Networked Learning Resources Survey

Improving Access to Networked Learning Resources for Students and Teachers

Questionnaire prepared by the Distributed Systems Technology Centre (DSTC) for the EdNA/CESCEO Schools Advisory Group

The range of learning resources available to students through the Internet and school networks is rapidly expanding. In order to derive maximum educational benefit from the information explosion it will be necessary to develop mechanisms which assist learners to quickly identify the best resources from a range of sources.

DSTC is undertaking an investigation on behalf of the EdNA Schools Advisory Group to explore improved access to and integration of Australia's networked learning resources. In particular, on-line resource initiatives operated by educational authorities and allied bodies such as cultural organisations will be examined.

To this end, the following survey aims to gather information about important current and planned network resource initiatives, and the role such resources are expected to play in improving educational opportunities for students and teachers. It is NOT intended to be a exhaustive survey of networked learning initiatives. Rather, the survey's intention is

- to inform us about on-line information systems which are likely to be of greatest significance in supporting student learning in Australia
- to help us identify opportunities for improved service provision and integration.
-

We are particularly interested in learning about

- current initiatives which successfully provide access to networked learning resources,
- current initiatives that have been successful within a closed community but have failed to share information beyond that community,
- important initiatives that are currently being planned or deployed,
- reasons initiatives fail or don't live up to their full potential,
- ideas on how to improve the situation.
- your vision for the future use of networked learning resources.

You have been identified as a key contact in your organisation with respect to the effective use of online education resources in schools, or as somebody who can identify those in your organisation with the expertise required to complete this questionnaire. Please take the time to respond to the survey and return it preferably via email
to:

margaret@dstc.edu.au
(or just reply to this message)

by:

Friday 12th February

We realise that the questions are quite open ended, but wish to give you as much of a say as possible. Be as brief or verbose as you feel fit. Feel free to respond to the survey a number of times.

We will use your responses to guide us in making recommendations on how to improve access to Australian networked learning resources. Responses and a summary will be placed on a website accessible to all respondents by 18 February 1999.

Definitions

Networked learning resources:
all information resources accessible to students and teachers via networks at school or at home, including Internet accessible resources, materials accessed via a school LAN or intranet (including school library catalogues those stored on CD-ROM), commercial information services, and on-line directory services.

Initiatives:
Efforts to provide organised access to networked learning resources via local area networks on campus, via dial-up facilities from home and remote sites and via the Internet. These efforts should aim to allow improved student access to information relevant to their studies or to facilitate teacher professional development.

The Survey

Contact Details

Organisation to which this response applies:

Name of person who compiled this response:

Address:

Phone: Fax:

Email:

I will be available to take part in a followup teleconference at 2:00 on (indicate one):

Monday 22 February Tuesday 23 February

Phone number to be used for teleconference:

Vision

Please outline your medium to long term vision for how networked learning resources can most effectively contribute to

1. Improvements in student learning,
2. Improvements in teacher professional development, or
3. More effective interaction between organisations and individuals in this sector.

Please indicate why some networked learning resources are more effective than others.

Networked Learning Initiatives

Please list initiatives that provide or enhance access to networked learning resources for students and teachers. We are interested in both current and planned initiatives, initiatives for which your organisation is directly responsible and those operated by organisations (eg. cultural organisations, professional associations, private sector) but which are used by your clients.

Please provide the following information for ***each*** of the initiatives listed.
Where you are unable to provide information please write "Unknown".

1. Name of initiative
2. Responsible organisation
3. Name of contact person, phone, fax, email
4. Brief description of content or service provided
5. Technology platform (eg. static html website, database driven website, NT operating system, Microsoft/ASP platform)
6. Metadata scheme(s) employed (eg. EdNA, local library metadata)
7. Arrangements planned or in place to share information with other organisations (eg. Z39.50 searches enabled)
8. Partner organisations involved in the operation, design or use of the service
9. Audience(s) served by the initiative
10. Estimated number of users per day
11. Special significance to students and teachers
12. Why do you think this initiative was/will be successful?
13. Suggestions for how the service could be improved (eg. service could provide searches based on SCIS subject headings as used in the school library catalogue)
14. Other comments

Integrating Initiatives

Do you have ideas on how

1. initiatives could be integrated to provide a better service?
2. information could be better shared between initiatives?

For example:

- A single search could operate across all major information collections relevant to our students
- Students and teachers could add comments and curriculum tags to particular on-line resources and have that information available to colleagues across the state, or nationally.
- The incorporation of key terms from the SCIS thesaurus in the development of a national metadata set could ensure compatibility with school library catalogues

Directions in Standardisation or Coordination

Please describe any initiatives you are aware of which are aimed at improving the linkage between networked resource initiatives (eg. a joint schools-library venture, or cultural sector collaboration project).

Do you have ideas on national or systems-wide standardisation or coordination initiatives that Australia should pursue?

We are particularly interested in low cost, high benefit initiatives that could be coordinated at a national level by EdNA SAG and could be easily incorporated into existing local initiatives.

Opportunities and Barriers to Collaboration

Can you identify any local opportunities or barriers to more effective collaboration between networked learning initiatives?

An example opportunity may be a local museum receiving increased funding for an education related initiative, or a State government pledging to improve access to networked learning resources within schools.

A possible barrier might be that your organisation has committed to using a local metadata standard and does not have the resources to comply with a national metadata standard.

Feel free to comment on possible implications of national education coordination initiatives within your organisation.

Further Comments

The EdNA SAG brief for this investigation is available at
http://www.dstc.qut.edu.au/sag/index.html
UserID: sag
Password: qoldstc

Do you have any other comments relevant to the EdNA SAG brief that we have not covered in this survey?

Do you wish to make any comments with respect to how you use networked learning resources?

Thanks for taking the time to complete this survey. Please return it
to:
margaret@dstc.edu.au
by:
Friday 12th February 1999

Appendix C - List of people and organisations consulted

The following people and organisations contributed to the survey and teleconferences:

Departments of Education in each state and territory:
- Australian Capital Territory - Natalie Lister for Mike Brown
- New South Wales - possibly Garth Newton
- Northern Territory - Lynne Telfer for Bob Cox
- Queensland - possibly Col Sutcliffe
- South Australia - Anne Hazell and Peter Simmonds
- Tasmania - Belinda Flowers, Lynley Hocking for Peter Croger
- Victoria - Bruce Rigby
- Western Australia - Chris Mawson, Philippa Ryan

Curriculum Corporation - Heather Watson
DETYA -
EdNA - Carol McKenny, Jon Mason
Education.Au - Jillian Dellit and John Mason for Gerry White
HEAG - Albert Ip, Mike Currie
NCEC - Garry Putland (SA), Jennifer Fawbert (NSW), Adrian Brown (NSW), Tim Taylor (SA), Carol Phillips (SA)
NCISA - Hazel Day (WA), Frank Brooks (NSW)

Appendix D - Summary of Responses to Survey

This is the document on the SAG Extranet website.

Contact details

See list of respondents at:
http://www.dstc.qut.edu.au/sag/responses/index.html

Vision

Improvements in student learning

All respondents described a future in which networked learning would promote new learning opportunities through

Content
- Providing access to a wide range of quality resources with less effort
- Delivering broader curriculum offerings for students
- Assisting in the development of information literacy skills and strategies
- Increasing the amount of local and focussed content, and improving the average quality of the content
- Harnessing the resources of heritage collections and research databases

Classroom environment
- Providing geographically independent learning experiences
- Providing interactive learning experiences
- Encouraging greater engagement and motivation in students
- Linking resources to specified learning outcomes and priorities
- Enabling teachers to support students to access information – rather than seek to provide it.
- Enabling students to analyse their work more easily and to process and produce better work.

Collaboration
- Delivering new options for collaboration and co-operation at local, State, National and Global levels
- Integrating multiple information sources through standards, protocols and the automation of systems
- Capitalising on value-adding by others

Customisation
- Offering students greater control over their learning environment and development of a learning environment which can cater for individual learning styles
- Delivering customised information eg. updates to user on nominated topics via "Push" style interface

Support
- Improved administrative support for students, parents and teachers through access to school related networks.

There were a number of interesting comments which gave more specific feedback including:

One respondent cautioned defining networked learning resources

> "as fitting into the traditional genre of *resources-based learning*. This is because in an online environment resources include:
> - Curriculum content - via information retrieval & resource discovery
> - Support materials - via information retrieval & resource discovery
> - Opportunities for engagement with others (students, teachers, administrators, technical advisers, mentors, ...) - i.e., opportunities for communication
> - Exposure to networks through hyperlinks - i.e., the online digital medium is a resource in itself."

Further this respondent required that networked learning resources should:
- be easily accessible
- empower & challenge students' cognitive abilities
- have undergone some kind of QA process by educators
- provide opportunities for reflection and interaction."

Another respondent looked at some refinements which could be delivered more efficiently:

> "providing a rich selection of quality resources which can be filtered within specific and defined parameters eg. currency, format, authors/publishers, individual characteristics like Australian, genre. This will assist students to acquire relevant and accessible information within manageable limits and with the variety of formats and delivery styles chosen by the student.
>
> One of the most powerful outcomes of networked learning resources should provide students with the ability to search a wide range of resources. This should be done within the context of one search activity and within very specific search criteria. This will deliver high quality, relevant information, quickly thus enabling the student to use his/her time efficiently to interrogate the information and engage in higher order thinking processes."

Another respondent drew a wider perspective for the role of networked learning resources within education. He stated

> "it is of national interest in order to develop an Australian presence in producing world case online learning in order to for Australians to participate effectively in the coming (or already arrived) information age. As far as Higher Ed. is concerned, the effectiveness of learning resource (and including networked versions) depends not only on the "effectiveness" of the material per se, but also on the effective distribution and subsequent adoption of the material by other people. The cost of production is high and without effective re-use, all good learning resources will have limited impact.....The national issue is to extend this reach!"

Improvements in teacher professional development

Again there was considerable agreement on the possible improvements for teacher professional development.

Accessibility
- Professional development when and where the teacher wants it
- Professional development independent of geographic location
- Access to and interaction with worldwide research and leading practitioners
- Provide opportunities and access to good practice online from different state systems
- Reduce the need to hold on to vast amounts of information. Similarly, when teaching, it becomes incumbent on teachers to enable students to access information – rather than seek to provide it.

Content
- Creation of Australian content
- development of a resource database that is searchable containing exemplars of lesson plans across all areas of the curriculum which can provide illustrative models of implementation strategies in a range of learning contexts. These can be complemented by associated discussion opportunities to expand issues arising from components of curriculum or technology arising from the case studies.

Collaboration
- Ability to share and contribute to networks of common interest
- Reduction in preparation time as duplication of materials can be distributed electronically

Customisation
- Providing self paced 'guided tutorials which allow teachers to participate in their own time and revisit when necessary
- Providing prompt individual feedback and often individually customisable learning experiences
- PD can be incorporated into teachers' existing work practice with monitoring and mentoring services occurring when the learner requires assistance

Support
- Greater access to mentors and peer support in out of school hours
- access to immediate, responsive curriculum and technical support to enhance integration of technology into existing teaching practice - trouble shooting model.

More effective interaction between organisations and individuals in this sector

Fewer respondents commented on improved interaction between organizations. Given the heavy bias in respondents to the Education Systems, an absence of information on the value of collaboration with other institutions was curious. There were implicit assumptions that students and teachers would have access to high quality resources and information provided by cultural and other institutions.

One respondent highlighted the need for collaboration in content development between education sectors and the significant cultural institutions which have a designated education market.

Why some networked learning resources are more effective than others

Factors which improved the effectiveness of resources included

Accessibility
- Access structures are more flexible
- Technical set up of the internal network in a school is robust and therefore does not require technical intervention/trouble shooting from classroom teachers to use network resources
- Based on an Open platform or system

Locatability
- Networked learning resources are well publicised

Usability
- Use is intuitive
- Users' information literacy skills have been developed to the level where they are able to use the resources effectively
- Resources are structured, well indexed and catalogued as opposed to randomly collected information
- Internal organisation of resources is consistent and logical

Searchability
- Range of resources is vast but able to be sifted

Content Quality
- Environment is controlled eg material is selected for its suitability for schools
- Value added resources eg. Where descriptive metadata is attached or linkages to other related collections
- Resources are up to date, well maintained resources which are supported by ongoing human and financial resources

Interaction
- Opportunities for interaction or engagement

Costs
- Costs are neutral

One respondent highlighted the need for targeted resource development as a key determinant to resource effectiveness. "Some networked learning resources are more effective than others because of the knowledge, (and application of that knowledge) of user needs. This implies some intervention or mediation at a relatively local level, so that specific knowledge informs selection (if not development), of resources and avoids assumptions made on generalisations about learning contexts. If content is too or inflexible in structure or presentation, the resource seems of limited use and appeal. Grouping related resources in a manner which encourages individual selection of pathways and self-paced models of communication and learning encourage more effective interactions than highly structured resources. "

Networked Learning Initiatives

See table.

The questions could have provided more explanations regarding terminology. Several respondents answered " I do not know what this means" to questions regarding technology platforms, metadata schemes and standards, and possible improvements such as SCIS.

Integrating initiatives

In terms of integrating initiatives those respondents who answered this section generally suggested technically oriented solutions like:

- Database applications which allow for user customisation of information
- A single search approach facilitated by the development of whole of government WAN
- Use of SCIS thesaurus could be a beneficial starting point but may need further expansion to accommodate needs of external organisations.
- Establishment of a set of basic standards eg. Z30.50, html, TCP/IP, Dublin Core
- One respondent suggested the development of an electronic resources pool which gathers information and resources from authorised networks. A cultural shift on the part of organisations who have information to share is required, because they need to hand over some of the control of their own resources.
- Initiatives in networking should focus on effective delivery of these elements with the widest possible diversity but with easy, transparent systems for contribution, management and access to the content resources.
- On-Line content for electronic resources needs to be developed in interesting ways. We need to be creative in content generation and delivery of curriculum materials.

Directions in Standardisation or Coordination

The term standardisation should have been defined in this question. It was intended to refer to information management standards, but it was also interpreted as referring to technical infrastructure standards.

Comments included:

Initiatives aimed at improving the linkage between networked resource initiatives:

- A possible national initiative currently being developed is the Telstra/Schoolsnet initiative which is being implemented in Victoria and SA (educache).

National or systems-wide standardisation or coordination initiatives to be pursued:

- EdNA metadata for cataloging electronic resources - "great value in terms of retrieval"
- School desire to make library one stop shop requires integration of web searching into other library searches. Investigation into ways in which searching on EdNA could be a transparent add-on to library automation systems in common use in Australian schools could be advantageous
- The first principle must be that the schooling sector works within other national initiatives and does not go out on its own.
- Links already exist in SA between education and libraries through the 50 school community libraries in this state. This formal cooperation is at the forefront of planning in all online projects involving the two sectors and has informed discussions relating to the whole of government WAN.
- Basically, get smaller regional areas to design the information and keep it up to date – if you try to do everything nationally you will be too hit and miss rather than small scale relevent. Then provide active links with excellent cross referencing to help with searches....otherwise this service will be like an out of date encyclopedia.
- Information access across systems eg libraries, museums, archives etc would be greatly enhanced by common standards and thesauri. eg adoption of PICMAN for pictorial resources (J Hofto, B Flowers).
- Typical SGML document divisions into structure, content and style provide significant areas for shared access and contribution if standardised approaches can be agreed. DTD (Document Type Definition) provides a framework (such as chapter headings, sections, topics, levels) for the elements much like a database schema describes the types of information it handles and the relationships between fields.
- One subject heading scheme for all libraries ie merge SCIS and LC. Children move between schools and public libraries and conformity with accepted international standard eg LCSH would lead to better retrieval and less confusion. This has been demonstrated in Tasmania where TALIS schools use the LC subject headings with some variations (J Hofto, B Flowers).

Opportunities and Barriers to Collaboration

Opportunities

The opportunities identified by respondents were:

- ACT is currently developing a metadata standard
- Development of a whole of government WAN in SA
- Promotion of joint partnerships between key government/semi-government organisations which have defined education as one of their key markets.
- Proposal to Curriculum Corporation Board which incorporates many of the priorities of this project into a broader set of eight initiating project which cover significant issues in the development of the national education online environment. There would need to be a collaborative strategy developed with players being, EDNA, Education .Au, School Systems and the Curriculum Corporation. These

projects included Copyright and intellectual property management, Commercial relationships in content development and distribution, Collaborative data storage and online pedagogy.

- EDNA site harvesting project - Nigel can you add to this?
- There is currently considerable areas of duplicated effort across States which is not cost effective. Technology delivery can and should be focussed on positioning Australian education as a major force in the international arena.

Barriers

All respondents highlighted the barriers to collaboration. They included

Access to resources

- One of the biggest barriers is the lack of access teachers have to computers and the online environment.
- Technical issues surrounding WAN security standards are problematic
- Homegrown nature of some school networks which will make the interface between the local and external networks difficult and thus require substantial capital input to configure the local system to the external system requirements
- Greater compatibility across the range of information providers, particularly the smaller software/information developers, is needed to address problems related to schools loading software onto a network, particularly their intranets.

Quality of Content

- Keeping information and the access pathways to information, current and relevant. This is recognised as a huge task and one that needs to be co-ordinated at a national level, though work can be undertaken at a local and State level.

Costs

- Limited funding opportunities are available as schools and sometimes systems have already set their financial priorities
- Push for cost recovery and entrepreneurial approaches at a system level limits the development of collaborative projects which require input from schools and partner organisations.

Management support

- Lack of understanding from senior education management of the resources required to maintain initiatives.

Appendix E - Table of Current and Planned Initiatives

National Collaborative Initiatives

Civics and Citizenship Education Research Projects	
Responsible organisation	Curriculum Corporation
Contact person	Sue Ferguson Ph: 03 92079600 Fax: 03 9639 1616 suef@curriculum.edu.au
Description of service provided	Encourage student research activities
Technology platform	HTML website plus CD ROM for NT; Mac and PC
Metadata scheme(s)	Dublin Core metadata plus SCIS based controlled vocabulary
Arrangements for sharing information with other organisations	
Partner organisations	DETYA funded, content developed with Civics Expert Reference Group selected by Minister.
Audience(s)	Teachers of SOSE nationally.
No. of users per day	
Special significance to students and teachers	Access to quality controlled content for developing cross-curriculum area. Access to resources, data and communication components focussed on classroom units and research investigations conducted locally. Communication with peers about both content and work styles.
Why it was/will be successful?	Provide resources involving students activities to research local information and present for network access. Communication with peers and an opportunity to communicate across geographic distance in collaborative activities extending awareness of local experiences.
Suggestions for how the service could be improved	Clearly all networked initiatives would benefit from shared use of agreed education specific controlled vocabulary to submit and access content online.

Curriculum Corporation website	
Responsible organisation	Curriculum Corporation
Contact person	Heather Watson Ph: 03 9207 9600 Fax: 03 9639 1616 heatherw@curriculum.edu.au
Description of service provided	Our networked services to support learning are generalised being national, and principally focussed through the website. The website delivers resources mainly for teacher use and for specific curriculum areas, in some cases accompanied by communication/data entry forms and other network support mechanisms. The main existing website content sections include providing content and several have networking components. Main sections of the site are Access Asia (country specific, thematic and online communication); Science Australia; Technology learning area; Literacy benchmarks; Civics and Citizenship Education; VET Training packages in Schools (separate industry areas plus generic PD); Enterprise education; OzJac and SCIS.
Technology platform	
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	
No. of users per day	
Special significance to students and teachers	
Why it was/will be successful?	
Suggestions for how the service could be improved	

SCISWeb	
Responsible organisation	Curriculum Corporation
Contact person	Keith Gove
Description of service provided	Access to catalogue records for school libraries, access to information able to be used for collection development
Technology platform	Database driven website
Metadata scheme(s)	USMARC
Arrangements for sharing information with other organisations	Not known
Partner organisations	Australian school education systems, especially cataloguing agencies in some education systems in WA, NSW, Vic, SA, Qld
Audience(s)	7000 schools
No. of users per day	Not known
Special significance to students and teachers	Empowers schools to access records at their convenience, and with little effort once original teething problems have been solved
Why it was/will be successful?	Efficiencies and cost savings at school levels, considerable support (e.g. cataloguing and statewide licences) provided by some education systems
Suggestions for how the service could be improved	

Supporting the Studies of Asia in Schools through Electronic Communication	
Responsible organisation	Curriculum Corporation
Contact person	Lan Wang Ph: 03 92079600 Fax: 9639 1616 lan@curriculum.edu.au
Description of service provided	• To develop new electronic facilities for studies of Asia teachers fully utilising the services of EdNA Online to ensure best use of facilities, links, information. • To develop the skills of teachers in using online Technologies and resources in this area of learning • Encourage peer communication between Studies of Asia teachers • Promote NALSAS initiatives and support for the area.
Technology platform	HTML website plus CD ROM for NT; Mac and PC
Metadata scheme(s)	Dublin Core metadata plus SCIS based controlled vocabulary
Arrangements for sharing information with other organisations	
Partner organisations	NALSAS initiative, AEF partners in developing PD and content.
Audience(s)	Teachers of Studies of Asia nationally, State AEF advisors and PD deliverers.
No. of users per day	In development (launch June 99)
Special significance to students and teachers	Access to quality controlled and aggregated content for developing area of learning. Communication with peers when the area is marginal in schools structure and curriculum.
Why it was/will be successful?	• Provide easily accessible resources designed for teachers and students when existing information, although vast, is unstructured and unrelated to curriculum implementation. • Communication with peers when teacher may be a sole enthusiast on a staff or in a geographically isolated location with limited opportunity to communicate about issues of teaching and learning in this area. • Online communication extends and enhances teaching and resources. Communication is supported by what are often existing personal contacts/friendships formed through In-Country tours arranged through AEF.
Suggestions for how the service could be improved	Clearly all networked initiatives would benefit from shared use of agreed education specific controlled vocabulary to submit and access content online.

Australian Capital Territory Initiatives

AUSLIT (planned initiative)	
Responsible organisation	ADFA library
Contact person	Marie Louise Ayres or Annette Mcguiness 02 6268 8174
Description of service provided	Comprehensive Database of Australian Literature resources
Technology platform	Database driven web site
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	Students and teachers of Australian Literature (primary, secondary and tertiary)
No. of users per day	
Special significance to students and teachers	Will provide a wealth of information on Australian Literature
Why it was/will be successful?	Cost has been prohibitive for ACT schools
Suggestions for how the service could be improved	

OCIRC Online <http://www.occ.act.edu.au/ocirc>	
Responsible organisation	O'Connell Information and Resource Centre
Contact person	Margaret Hyland Ph: 02 6205 8217 Fax: 02 6205 8250 margaret_hyland@dpa.act.gov.au
Description of service provided	OCIRC is the department's resource centre providing an online resource and information service for teachers and central office. The services include: directory of links to online key learning area resources, local bibliographies of resources, information searches
Technology platform	Web resource
Metadata scheme(s)	EdNA metadata standards
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	ACT schools and DECS staff
No. of users per day	
Special significance to students and teachers	This resource is of significance for staff trying to locate relevant online resources (resources focus on relevance to ACT curriculum and initiatives, system priorities and staff requests.
Why it was/will be successful?	This resource is particularly useful for new online users – providing a very focussed and manageable directory of links
Suggestions for how the service could be improved	

OCIRC on CD	
Responsible organisation	O'Connell Information and Resource Centre
Contact person	Fran Wilson Ph: 02 6205 8218 Fax: 02 6205 8250 fran_wilson@dpa.act.gov.au
Description of service provided	OCIRC catalogue on CD
Technology platform	Window, Dos, Mac (Winspirs)
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	RMIT Publishing
Audience(s)	ACT teaching staff
No. of users per day	
Special significance to students and teachers	Of special significance to teachers wanting to identify resources held in the library.
Why it was/will be successful?	This resource has allowed teachers more effective access to the library catague and assists planning and preparation of lesons.
Suggestions for how the service could be improved	A future initiative is to provide access to this resource over the ACT education WAN and other school library catalogues (through Alice)

New South Wales Initiatives

Catholic School Office, Diocese of Broken Bay website	
Responsible organisation	CSO Broken Bay
Contact person	Jenny Fawbert Ph.0294873777 Fax0294890043 jennifer.fawbert@cso.brokenbay.catholic.edu.au
Description of service provided	Diocesan website will eventually provide information on the activities and services of the CSO for public, parents, teachers and students and links to Diocesan schools and teaching/learning resources.
Technology platform	HTML website (eventually with databases)
Metadata scheme(s)	Undecided at this stage
Arrangements for sharing information with other organisations	Undecided at this stage
Partner organisations	None.
Audience(s)	Any user of WWW
No. of users per day	Unknown
Special significance to students and teachers	Aims to provide a contact point for enquiries about Catholic education and education.
Why it was/will be successful?	Because it is being designed to meet the unique needs and aims of the CSO.
Suggestions for how the service could be improved	

LearnIT	
Responsible organisation	Balywn North Primary School, LearnIT working group
Contact person	Albert IP, a.ip@meu.unimelb.edu.au
Description of service provided	We would like to develop an online homework system in order to involve other members of the families of the children attending the school to create a supportive learning environment of the children.
Technology platform	Dynamic web site running PIET engine to support creation of homework by teachers with minimum training in IT. Current version of PIET runs on NT.
Metadata scheme(s)	Not at the moment
Arrangements for sharing information with other organisations	Not at the moment
Partner organisations	Telstra (funding), Albert Ip.
Audience(s)	Year 5 & 6 children and their families of the school for this year. Extend to year 3 & 4 next year
No. of users per day	During school term, each child is expected to participate at least on a weekly basis either via the workstations in their classroom, and better still together with their family members at home connected via ISP to the school's website. The operation is expected to start about May this year. In the first year, the year 5 and 6 have about 150 children.
Special significance to students and teachers	Teachers are empowered to create their exercises without the need of acquiring the complex programming skill in order to create engaging activities. Students are expected to benefit significantly through the fostering of a better learning environment (involvement of their family). Direct benefit (even for those students only accessing the system on the school's network) is new approach to doing exercise and hence have better retention of the material already covered in class.
Why it was/will be successful?	Yes, the educational design (still in progress) was well informed and sound, technical skill of implementation is available.
Suggestions for how the service could be improved	The current SCIS subject headings can only identify the area on which the exercise was original designed. However the current thematic approach implies that several KLA's will be covered by the same exercise. Hence other scheme must be employed together with SCIS. DC.type will be another interesting issue for this particular initiative.

OnLine Resources for Religious Educators	
Responsible organisation	Catholic Education Commission, NSW
Contact person	Adrian Brown Ph: 02 9287 1528 adrian.brown@cecnsw.catholic.edu.au
Description of service provided	This is an OnLine resource being developed by the CEC to assist teachers and students in tracking down appropriate resources for Religious Education. It consists of a database in which resides the URL's of OnLine content relevant to Religious Education. A forms based web interface allows the user to dynamically generate from the database lists of resources applicable for teaching particular strands appropriate to particular stages or levels. Depending upon the level entered advice is supplied as to how the resource list could be suitably used.
Technology platform	Active server pages
Metadata scheme(s)	One of the problems associated with dynamically generated material is that the metadata is not harvested by search engine robots.
Arrangements for sharing information with other organisations	I would like further information on Z39.50 searches
Partner organisations	This project at the moment targets NSW schools, but in partnership with the National Catholic Education Commission it will become a national project.
Audience(s)	All teachers in Catholic schools throughout Australia
No. of users per day	Hard to say
Special significance to students and teachers	It is an attempt to bring those teachers who teach religious education to the enrichment possible through the OnLine environment
Why it was/will be successful?	Will help a group of reluctant teachers into productive use of the OnLine environment
Suggestions for how the service could be improved	I am sure that there will be many

StudentNet	
Responsible organisation	The Association of Independent Schools of NSW
Contact person	Frank Brooks Ph: 02 9299 2845 Fax: 02 9299 3121 manager@studentnet.edu.au
Description of service provided	www.studentnet.edu.au *StudentNet* provides a password secured online learning community for K-12. Members can use of a number of tools that encourage collaboration. They can also publish materials and access content and reviews provided by others. *StudentNet* also provides a publishing forum for all Association of Independent Schools of NSW materials such as course information for teachers and projects such as VET. School Sports information is also available.
Technology platform	
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	K-12 Australia wide. International membership too.
No. of users per day	
Special significance to students and teachers	• Run by educators for the K-12 education community • Provides an integrated solution to web resources and internet support - web/mail hosting and development/PD etc
Why it was/will be successful?	• Run by educators for the K-12 education community • Provides and integrated solution to web resources and internet support - web/mail hosting and development/PD etc
Suggestions for how the service could be improved	

Northern Territory Initiatives

Access to information for NT Dept. of Education Staff	
Responsible organisation	
Contact person	Lynne Telfer Ph: 08 8922 2211 Fax: 08 8922 2224 olsu.darwin@nt.gov.au
Description of service provided	The NTDE is currently putting important documentation on the Internet/Intranet for NTDE staff access. OLSU has created the following websites for NTDE units: HRD Inservice Directory http://www.ntde.nt.gov.au/prod/hrd/course.nsf NT Schools Directory http://www.ntde.nt.gov.au/prod/ic/ntdedir.nsf/School+By+Region%5Cdarwin?OpenView Conditions of Service Website (yet to be uploaded into correct server) Schools Policy Handbook Online Website http://www.ntde.nt.gov.au/prod/ntedweb/schpol.nsf/toc School Management Handbook Online Website http://www.ntde.nt.gov.au/prod/ntedweb/schpol.nsf/toc NTDE Staffing Website http://www.schools.nt.edu.au/staffing/ Partners in Education Website (yet to be uploaded into correct server)
Technology platform	Static Websites
Metadata scheme(s)	EdNA schema.
Arrangements for sharing information with other organisations	Placing link on EdNA. Some of the above websites have been advertised through the Education Bulletin, others are awaiting upload to the new server.
Partner organisations	Various NTDE units were involved with initiating the websites and providing content: HRD, Schools Policy Branch and NTDE Staffing Branch.
Audience(s)	NT Teachers and other NTDE staff.
No. of users per day	Unknown
Special significance to students and teachers	Access to frequently updated documentation normally difficult to find especially for remote schools.
Why it was/will be successful?	NTDE staff are already commenting on the wealth of information provided. The sites will be easy to find from the existing OLSU and NTDE websites.
Suggestions for how the service could be improved	Commitment from the involved agencies to maintain up to date information on their sites, where appropnate online forms should be made available.

Access to information for NT Teachers	
Responsible organisation	
Contact person	Judith Evans C&COfficer 1998 - now Education Advisor OLSU Ph: 08 8922 2218 Fax: 08 8922 2224 judith.evans@nt.gov.au
Description of service provided	The Create and Communicate created a CD based website for NT Teachers called 'Internet Insights'. The CD came with a book consisting of activities and lesson plans collected from teachers around the Northern Territory.
Technology platform	Static Website on CD
Metadata scheme(s)	Unknown.
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	NT Teachers
No. of users per day	Unknown
Special significance to students and teachers	Access to relevant help for teacher who want to learn about the Internet but cant get enough access or have poor lines due to remoteness.
Why it was/will be successful?	Teachers are already commenting on the wealth of information provided.
Suggestions for how the service could be improved	Updated versions may be a consideration in the future.

Access to lessons - online	
Responsible organisation	
Contact person	Giselle Pryor NTOEC Library Ph: 08 8922 ____ Fax: 08 8922 2224 giselle.pryor@nt.gov.au
Description of service provided	The Northern Territory Open Education Center is trialing the use of online lessons and activities.
Technology platform	Static Website
Metadata scheme(s)	Unknown
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	Secondary Teachers and Students. High schools are trialing the website. Distance Education Students
No. of users per day	Unknown.
Special significance to students and teachers	Provide information and guidance for students of distance education courses
Why it was/will be successful?	Teachers are already commenting on the usefulness of the website.
Suggestions for how the service could be improved	Feedback from users.

Spike and Eddie Explore the Northern Territory	
Responsible organisation	Eddie's Northern Territory Research Project is an initiative of EdNA (Northern Territory) and the Open Learning Support Unit of the Northern Territory Department of Education.
Contact person	Lynne Telfer Ph: 08 8922 2120 Fax: 08 8922 2224 lynne.telfer@nt.gov.au
Description of service provided	This project is designed to meet any of the following foci: Teaching and learning researching skills on the Internet using EdNA as the example search engine and the 'Northern Territory' as the focus. Teaching and learning about the many features of the EdNA Directory. Teaching and learning about the Internet using EdNA to teach basic concepts. Teaching and learning about the Northern Territory using activities and tutorials provided. Search EdNA for Northern Territory Websites. The teacher sites includes: The Program Page Lesson plans Activity sheets (print or download) The Teachers' EdNA Tour The Teachers' Research Tour Teacher Talk Feedback Northern Territory Schools Eddie's EdNA Search Page Example of school's use of EdNA The student sites include The Students' Research Tour The Students' EdNA Tour The Basic Internet Tour The School of the Moment Page Spike's Quiz Eddie's Competition Page Spike's EdNA Search Page
Technology platform	Dynamic HTML website
Metadata scheme(s)	EdNA standard
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	NT Teachers and students at this stage - the rest of the world can also use the site to research about the Northern Territory.
No. of users per day	Unknown- not yet operating
Special significance to students and teachers	Access to relevant help for teachers who want to learn about ways to research using the Internet and find lesson plan ideas. Students can learn about EdNA, researching on the web, find out about the Northern Territory and join monthly activities and classroom or online competitions. Both students and teachers can communicate with others and contribute.
Why it was/will be successful?	Teachers and other Education Staff are already commenting on the great potential of the Eddie and Spike website.
Suggestions for how the service could be improved	It will be modified as more students and teachers trial the website in the next six months.

Virtual Sports Day	
Responsible organisation	The website has been given to the School of Health and Physical Education to convert into the Virtual School Olympics site.
Contact person	Alan Hungerford Ph: 08 8922 6076 Fax: 08 8922 6080 Alan.hungerford@nt.gov.au
Description of service provided	Judith Evans, Open Learning Support Unit, created the Virtual Sports Day. It ran during the Northern Territory Health and Physical Education week in 1998. Schools were able to go to the website and print an activity sheet showing the activities they wished to participate in. They were to choose some activities and the class then ran the events. The teacher would fill in the email form and the results would be manually entered into the website by the coordinator. The competition was time based, rather than students competing against each other.
Technology platform	HTML website -updated every day during the event.
Metadata scheme(s)	The Virtual Sports Day has not yet put metadata into the website. They will use the Metadata wizard on EdNA to do so.
Arrangements for sharing information with other organisations	Put on most search engines and advertised in the NT Education Bulletin. OLSU will advertise the website when it is ready for the next round of competition.
Partner organisations	OLSU created and designed the website with SHAPES as an inter-agency initiative. We ran the first competition as part of the OLSU Create and Communicate project. The C&C project ceased at the end of 1998 so the website was presented to SHAPES for future management.
Audience(s)	Primary School Teachers and Students
No. of users per day	User per day - unknown. The website received around 400 student results.
Special significance to students and teachers	The students benefited by participating and the teachers commented on the motivation the website brought to their PE sessions.
Why it was/will be successful?	The students were able to achieve the goals of the project and get very significant positive feedback about their achievements. It made PE great fun! Each student was sent a certificate recording his or her results. It was seen as a successful, positive motivational activity.
Suggestions for how the service could be improved	The site will be changed and improved upon on a needs basis.

The YakNet Project	
Responsible organisation	NCISA
Contact person	Hazel Day Ph: 08 9431 7404 Fax: 08 9431 7405 hazel@daywest.com.au
Description of service provided	This project was aimed at providing teachers new to on-line technology in independent schools with some assistance in an easy-to understand and non-threatening way. This was a DEETYA funded project and resulted in (i) a simple Handbook – YakNet Handbook 1998 being compiled; 4000 copies being printed and distributed to all independent schools in Australia. (ii) a website (YakNet) being developed for the use of these teachers (iii) a mailing list (yaknet) being organized for these teachers to network with others and to receive information on e.g. appropriate websites, how to use technology well etc. This was an EdNA initiative and EdNA was promoted through these sources.
Technology platform	
Metadata scheme(s)	Not applicable
Arrangements for sharing information with other organisations	Mailing list is open for any to subscribe, handbooks were available for government and catholic systems to access.
Partner organisations	See earlier.
Audience(s)	Teachers in independent schools
No. of users per day	Not available
Special significance to students and teachers	Provides opportunities for teachers to learn about technology as a tool in the curriculum in a non-threatening and simple way, provides teachers with the opportunity to network with others.
Why it was/will be successful?	Because it was developed to service a need
Suggestions for how the service could be improved	Since the DEETYA funding has finished, it now relies on voluntary help to keep the initiative going, which is a pity as it is servicing a need that benefits many students in Australia.

South Australian Initiatives

South Australia Central—www.sacentral.sa.gov.au/	
Responsible organisation	South Australian government
Contact person	Unknown
Description of service provided	An easy to use point of access to South Australian information and services on the Internet. Brings together community, commercial and Government content from South Australia. Lists all government departments with links to home pages where existing.
Technology platform	Database driven website
Metadata scheme(s)	Unknown
Arrangements for sharing information with other organisations	Unknown
Partner organisations	• Production: Department of Administrative and Information Services • Host site: State Library of south Australia • Web Visualisation and Management Software: Maxamine International • Interactive Branding: Landor Associates • Server Hardware: administered by EDS
Audience(s)	Non specific
No. of users per day	Unknown
Special significance to students and teachers	Detailed, up to date information about South Australia often not available elsewhere; on one site with search facility across all organisations involved.
Why it was/will be successful?	See previous question.
Suggestions for how the service could be improved	Search engine needs to be more powerful.

Outreach Education Services—http://oac.schools.sa.edu/oes	
Responsible organisation	Open Access College, Department of Education, Training and Employment
Contact person	Unknown
Description of service provided	Outreach Education Services consists of education officers to cultural, environmental, scientific and historic centres in Adelaide, South Australia. The education officers are part of the Open Access College and provide services to schools across the state. The Outreach Education Services site within the Open Access College site provides links to the home pages of the centres where education officers are located. Each home page is in a standard format, making access consistent. The centres are • Art Gallery of SA • Botanic Gardens • CSIRO • DEEHA • Festival Centre • Law Courts • Maritime Museum • Parliament House • SA Museum • Tandanya • Adelaide Zoo
Technology platform	Database driven website
Metadata scheme(s)	Unknown
Arrangements for sharing information with other organisations	Unknown
Partner organisations	As listed above—all these sites have their own home pages but there do not seem to be links between the 'education' home pages and the general home pages.
Audience(s)	Primary audience is SA schools; specifically designed for students in schools remote from Adelaide
No. of users per day	Unknown
Special significance to students and teachers	Sites have education officers who design programs and identify resources of particular relevance to schools—coordinated, consistent
Why it was/will be successful?	See Description of content or service provided, and and previous question
Suggestions for how the service could be improved	Needs single access entry point for searching across sites.

Tasmanian Initiatives

Classroom literacy website	
Responsible organisation	DoE, Tasmania
Contact person	Doug Bridge Ph: 03 62337415 Fax: 03 62336980 Doug.Bridge@central.tased.edu.au)
Description of service provided	• Modelling a diagnostic targetted assessment process for teachers to identify students strengths and weaknesses in the literacy area, • Offering immediate access to a wide range of literacy strategies for students at risk of reading failure • On line PD in the area of literacy teaching • Chat rooms and board rooms for teachers to share with one another • Strategy submission and sharing processes.
Technology platform	Database driven website
Metadata scheme(s)	Not at present but planned. Developing our own metadata processes (bank and retrieval)
Arrangements for sharing information with other organisations	On test server at present, still in draft form really about to start trials in schools/school communities
Partner organisations	Catholic education office, UniTas, Dytech
Audience(s)	Primarily teachers of students years 3 to 6
No. of users per day	Currently unresearched
Special significance to students and teachers	The only model of its kind, offers immediate access to proven teaching strategies
Why it was/will be successful?	Teacher designed, teachers friendly, supported through detailed research and throughon going focused PD
Suggestions for how the service could be improved	

Department of Education LOTE website (http://www.tased.edu.au/eddiv/learn/lote/index.htm)	
Responsible organisation	Department of Education, Tasmania
Contact person	Barrie Muir Ph: 03 6233 7333 Fax: 03 6233 6983 Barrie.Muir@Central.tased.edu.au
Description of service provided	The website contains a wide range of information for teachers and students of LOTE including a comprehensive selection of links to sites both within Australia and overseas. The site also provides teachers with the opportunity to communicate with each other to share professional experiences and materials. I have created a power point presentation which provides a more comprehensive explanation of what the website contains and the information it provides. This site contains many links to initiatives undertaken by other cultural and professional organisations throughout Australia. Most of these can be found on the following page : http://www.tased.edu.au/eddiv/learn/lote/loteprofass.htm
Technology platform	html website - not known whether static or database drive.
Metadata scheme(s)	Unknown
Arrangements for sharing information with other organisations	Other organisations have expressed an interest in linking to this website but I don't know whether this has occurred or not.
Partner organisations	Nil
Audience(s)	Teachers and students of LOTE throughout Tasmania.
No. of users per day	Unknown
Special significance to students and teachers	Yes. There is something for everybody.
Why it was/will be successful?	Because it provides a service which hasn't been available before. It has placed a wealth of information at the finger-tips of teachers and students of LOTE.
Suggestions for how the service could be improved	

English Website	
Responsible organisation	Department of Education, Tasmania
Contact person	Charles Morgan, Ph: 0362337284 Fax: 0362336983 Charles.Morgan@central.tased.edu.au
Description of service provided	The English website is a rich source of information and ideas designed to support the professional learning of teachers. There are also sections for coordinators, students and parents. As well as providing guidelines for teaching English, the site is full of practical suggestions and has numerous links to others sites. The Online Mentoring program for beginning teachers of English aims to support the professional learning of beginning teachers by pairing them with experienced teachers and giving them the opportunity to participate in an ongoing professional discussion with other beginning teachers and their mentors. A range of discussion groups for English teachers is being organised. The first will be on choosing and using children's literature in the classroom.
Technology platform	Unknown.
Metadata scheme(s)	Unknown.
Arrangements for sharing information with other organisations	None so far.
Partner organisations	TATE and Language Australia will be involved in supporting/reporting on the online mentoring program.
Audience(s)	Mainly teachers of English
No. of users per day	Unknown
Special significance to students and teachers	A new vehicle for professional learning
Why it was/will be successful?	A fresh approach, accessible through the internet when convenient for teachers; the involvement of experts in different aspects of English teaching
Suggestions for how the service could be improved	None at this stage.

Networked indexes and full-text journals (planned)	
Responsible organisation	SLT
Contact person	Jill Abell Ph: 03 6233 7201 Jill.Abell@central.tased.edu.au
Description of service provided	SLT has networked selected indexes to all public libraries. There are plans to extend this service to all schools that are part of the statewide automated library network (TALIS) and wish to participate.
Technology platform	Access is via the DoE WAN and Web browser, with indexes located on the NT server in Hobart.
Metadata scheme(s)	N/A.
Arrangements for sharing information with other organisations	Some indexes/full text may be accessed directly through the Web, with SLT managing licencing arrangements - a partnership between the SLT and participating schools.
Partner organisations	SLT, DoE Library and Information Centre, Schools, Index providers
Audience(s)	All teachers and students in participating schools.
No. of users per day	Unknown
Special significance to students and teachers	See next.
Why it was/will be successful?	Initiative is designed to reduce costs to schools and facilitate access to a wider range of resources than previously available. It will be complemented by parallel investigation into document delivery of journal articles to schools.
Suggestions for how the service could be improved	

TALIS	
Responsible organisation	SLT, DoE
Contact person	Belinda Flowers Ph: 03 62 337939 Belinda.Flowers@central.tased.edu.au
Description of service provided	TALIS is the statewide library automation and information management system used by all Tasmanian public, reference and TAFE libraries, plus over half the schools and colleges. TALIS aims to provide an integrated interface to all types of information sources including the library catalogue, digital images, networked indexes and web-based resources Long-term plans are for all schools and colleges to be connected.
Technology platform	Library database utilises unix, the Web server will be NT-based, the search access will be via a Web browser and Microsoft desk-top products will be utilised.
Metadata scheme(s)	Library catalogue utilises MARC, Web resources utilise Dublin Core and EdNA.
Arrangements for sharing information with other organisations	Z39.50 will be the standard for information exchange
Partner organisations	Unknown
Audience(s)	All Tasmanians
No. of users per day	Unknown
Special significance to students and teachers	Provides seemless and integrated access in the classroom to all information resources relevent to the teaching program
Why it was/will be successful?	As above
Suggestions for how the service could be improved	

Tasmanian Cultural Images Project	
Responsible organisation	SLT, Archives Office of Tasmania, Tasmanian Museum and Art Gallery
Contact person	Tony Marshall Ph: 03 62 337474 Tony.Marshall@central.tased.edu.au Belinda Flowers Ph: 03 6233 7939 Belinda.Flowers@central.tased.edu.au
Description of service provided	Digitising of heritage items to facilitate access to all Tasmanians utilising Web delivery. SLT, Archives and Museum are each digitising their own resources using agreed standards.
Technology platform	State Library utilises a static html website, with data extracted from the library management database.
Metadata scheme(s)	Dublin Core
Arrangements for sharing information with other organisations	This project is part of the Image Search, a pilot for cooperative metadata-based image resources coordinated by the National Library and also including the State Library of Victoria. It uses distributed resource concept and harvested metadata with consolidated searching.
Partner organisations	SLT, AOT and TMAG for resource development; NLA and SLV for Image Search and cooperative access.
Audience(s)	Global
No. of users per day	Unknown
Special significance to students and teachers	Provides access to heritage materials previously unavailable in the learning environment
Why it was/will be successful?	Making a rare and valuable resource accessible to the whole community.
Suggestions for how the service could be improved	Use of common thesauri across institutions eg Library of Congress and PICMAN subject headings. Integration of image search with other information searches.

Victorian Initiatives

ASAPWeb incorporating: **- CERN WWW Virtual Library for the History of Science, Technology and Medicine (in existence since 1994)** **- Bright Sparcs (on the Web since 1994, previously in print and on OZLINE)** **- Australian Science at Work (a complementary site to Bright Sparcs to go online in 1999)** **- the Australian Society of Archivists, Directory of Archives in Australia**	
Responsible organisation	The Australian Science and Technology Heritage Centre, The University of Melbourne (formerly the Australian Science Archives Project)
Contact person	Gavan McCarthy Ph: +61 3 9344 9287 Fax: +61 3 9349 4630 gavan@asap.unimelb.edu.au
Description of service provided	A broad variety of information sources (some 10,000 web pages) dealing with the history of science, technology and medicine generally but with a specific focus on the history of Australian science, technology and medicine. Information content is obtained from scholarly sources but re-presented in a form that communicates well with the general public and of course schools.
Technology platform	Database driven website that comprises significant static web structures and database / metadata driven filtering and selection.
Metadata scheme(s)	Principle online bibliographic metadata scheme used at this time is one that is archival and Bright Sparcs specific (see below). We will be moving to full Dublin Core but also be looking at AGLS - also happy to look at EdNA - the metadata is just another programmed output from the database and in that sense is not problematic.
Arrangements for sharing information with other organisations	Our information is free and currently available as html encoded objects. We are planning to move to XML encoded objects which will enable far greater re-use of the data in other applications.
Partner organisations	The Australian Science and Technology Heritage Centre collaborates with a wide variety of related organisations to improve the content scope and functionality of the site.
Audience(s)	General public, schools, academic community, scientific community, government, industry
No. of users per day	Period covered by these statistics: 8 days (10 Apr 1999 - 17 Apr 1999) Total number of requests: 245,331 Number of unique requests: 10,149
Special significance to students and teachers	Site is already widely used by students and teachers and some teaching materials and aids are provided on the site. Information can be used to support science subjects as well as Australian history and social studies. Date range of material is from early Australian history to the present.
Why it was/will be successful?	This initiative has been remarkably successful due to the conceptual framework used to organise and present the information, it is free, it is updated regularly, it derives from scholarly data, we respond to staff, students and other users directly when the request further information.
Suggestions for how the service could be improved	There are lots and lots of things we would dearly love to do if only we had the funding - but one is to integrate more closely with the school curricula. Extended metadata and classification would be one way.

Ed-online - http://www.mov.vic.gov.au/ed-online/	
Responsible organisation	Museum Victoria
Contact person	Bill Coppinger Ph: 04 19387591 Fax: 03 96516129 bcopping@mov.vic.gov.au
Description of service provided	Museum Victoria has actively deployed a series of online learning resources that encourage/support online enquiry based collaborative learning activities. Specifically, Museum Victoria scientific and heritage collections have been actively designed for open ended enquiry and investigation. A "Global Classroom" methodology has been specifically supported to target education sectors both within Victoria and across Australia/Globe
Technology platform	Actively driven content; ASP/Cold Fusion/SQL; NT/UNIX/SUN/MAC; Streaming media/Virtual Reality/3D; Custom built 'back-end' solutions for Museum legacy systems; PDF/HTML/DHTML/FLASH/SMIL/Real media/Quicktme
Metadata scheme(s)	July 11999 is target date for implementation. Actively designing planning. Planned support of Dublin Core/ Edna sets/DoE-Vic Sets i.e ed-channel requirements
Arrangements for sharing information with other organisations	MV is major contributor to Arts Vic "Zavier" project. http://www.zavier.net The aim of the project is to be able to search across a range of distributed cultural agency databases, and deliver an on-line sample of multi-agency source content, as an example of how interoperability between heterogeneous databases can be achieved using Z39.50 Ongoing developments within MV include "EMU" project which will integrate 130+ years of legacy systems within collection management systems to support resource discovery and data mining activities.
Partner organisations	Department of Education Vic
Audience(s)	All formal and non-formal education sectors. State, National and international
No. of users per day	User sessions for month of April (Including school holidays) 235 Users per day averaging 9-11 minutes online
Special significance to students and teachers	Designed specifically to meet curriculum needs but allows more sophisticated query and use of site that static "content".. i.e Bio-informatics... http://www.mov.vic.gov.au/bioinformatics/
Why it was/will be successful?	Overwhelming usage figures and feedback indicate high tack-up rates. Open "discovery" methodology allows greatest contextual interpretation by users. This creates enormous value when coupled with unique/high quality content. Targeting KEY Learning areas further contextualises resources
Suggestions for how the service could be improved	META Data details, an additional design of customisable interfaces.

Education Channel	
Responsible organisation	Dept of Education, Victoria
Contact person	Ian Perry Ph: 03 9637 3337 Bruce Rigby Ph: 03 9637 2149
Description of service provided	The Ed Channel will provide a gateway to all DoE content available through SOFWeb (see above) and other DoE content courses as well as content from affiliated third party content providers. The system will enable students, teachers and the general public to locate material about and in support of learning in all sectors of education in Victoria. It will form part of the Governments Victoria On-Line 2001 initiative which aims to put all transactions relating to Government services on line. The project is currently being tendered. It is hoped that the initiative will stimulate the production of new local content by creating a heavily used n on-line market place
Technology platform	
Metadata scheme(s)	Will comply with EdNA and with Victorian education extensions currently under development
Arrangements for sharing information with other organisations	Central to design. Expect to link to EdNA and cultural organisations initially
Partner organisations	Contractor, EdNA, cultural organisations, academic institutions, commercial content providers
Audience(s)	Students, teachers, schools leaders and the general public in Victoria and elsewhere
No. of users per day	Potentially 500,000
Special significance to students and teachers	Teachers and students: One button search for high quality support materials from the DoE, web, cultural organisations Parents and public: Easy guide to department services and information Guide to local commercial services for schools
Why it was/will be successful?	Builds on the established high level of use of on-line resources through SOFWeb, etc. Will focus increasingly on high quality local resources as they become available and accessible through cultural organisations and commercial providers.
Suggestions for how the service could be improved	Standardised use of metadata and controlled languages within content sectors will be useful (eg. Schools systems specify against curriculum frameworks, state/national goals, Museums specify in more generic terms eg Shipwrecks. Assume full content text searching available everywhere Acknowledge that third party organisations not likely to invest in adding fine grained system specific metadata but it should be possible for systems to associate fine grained metatdata with third party resources – EdNA has created a precedent (just need to add local metadata capacity). Devise a system that would enable translation of detailed local metadata (eg. Links to Learning outcomes and frameworks) into frameworks appropriate to other systems and users. Ultimately a teacher from any state would be able to access support materials relating to local outcomes from other states.

Heinemann Interactive	
Responsible organisation	Heinemann
Contact person	Melinda Tuckfield Ph: 03 9245 7252 Fax: 03 92457333 melinda.tuckfield@reededucation.com.au
Description of service provided	Online science resource database for teachers and students
Technology platform	ASP and SQL server database driven using Microsoft Commercial Internet System 3.0
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	IQ MEDIA, New Scientist, The AGE
Audience(s)	Secondary teachers and students
No. of users per day	
Special significance to students and teachers	Updated and readily accessible teaching resources
Why it was/will be successful?	Market will be looking for this type of quality online resource
Suggestions for how the service could be improved	Access to metadata organization tables etc

Informit Online <http://www.informit.com.au>	
Responsible organisation	RMIT Publishing
Contact person	Jenny Casey Ph: 03 9349 4994
Description of service provided	Web site providing access to a large number of Australian bibliographic databases in a number of subject areas
Technology platform	Database driven web site
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	Students and teachers in secondary and tertiary study
No. of users per day	
Special significance to students and teachers	Provides quick access to bibliographic citations in journals, books, and conferences improving the selection of materials in the research process
Why it was/will be successful?	A fairly new initiative
Suggestions for how the service could be improved	Many teacher librarians and schools are unaware of the value of the resources found in these databases because they are not full text and require users to track down the relevant article etc. They would be enhanced by inclusion of some full text. Fran Wilson (OCIRC) is about to start negotiations with schools to develop a consortium of interested parties in the ACT.

SOFWeb	
Responsible organisation	Dept of Education, Victoria
Contact person	Judy Schober Ph: 03 9637 2148, Fax: 03 9637-2140 judy_schober@dse.vic.gov.au
Description of service provided	Extensive website including 6000 html pages (12,000 downloadable objects) and 20 interactive databases of student, teacher and admin support materials tailored for Victorian schools with discussion groups and directory of quality assured Internet resources linked to the Curriculum and Standards Framework
Technology platform	Windows NT, O'Reilly's Website and WebBoard, databases either CGI/MS Access or Filemaker. Currently under redevelopment to accommodate SQL server and ASP technology
Metadata scheme(s)	SOFWeb has used its own slim metadata standard for several years. It is currently being expanded to incorporate the EdNA metadata standard as well as new requirements for the Education Channel
Arrangements for sharing information with other organisations	None in place at present. EdNA and other searches launched from within SOFWeb
Partner organisations	SOFWeb works with all DoE divisions and a range of partner organisations
Audience(s)	All students, teachers, school leaders and parents, overseas students
No. of users per day	2,200 visitors and 14,000 page exposures (approx 150,000 "hits") per day
Special significance to students and teachers	Provides support materials and other resources for many programs. It also provides the platform for collaborative projects amongst more than 1100 schools.
Why it was/will be successful?	Provides teachers with resources that they really need (as opposed to things that are just of interest) as well as a meeting place on the net for people with similar interests
Suggestions for how the service could be improved	The system would be better if all the content could be integrated into a system that could link all the material to DoE priorities. This is under way

Visual Arts Multimedia Management and Access System	
Responsible organisation	National Gallery of Victoria
Contact person	Helen Page Ph: 03 9208 0440 Fax: 03 9208 0245
Description of service provided	Digitising collection to minimum A4 catalogue publication quality with conversion to various screen resolutions for inhouse and web access. Development of public access database of images, supporting multimedia objects and interpretative material for access in Gallery and online. Development of electronic copyright and intellectual property management system (ECMS). Web development to generate dynamicweb site, also to include ecommerce, ECMS, information about Gallery, virtual exhibitions, online educational resources, multimedia educational resources.
Technology platform	Current site at www.ngv.vic.gov.au is static html hosted by ABA. RFT released for upgrade of this site.
Metadata scheme(s)	Minimum Dublic Core; CIMI extensions are being considered.
Arrangements for sharing information with other organisations	The National Gallery of Victoria is participating in the ZAVIER project in order to assess the viability of deploying Z39.50 for sharing access to its data along with other partner organisations. This project involves DSTC, State Library of Victoria, Museum Victoria, Cinemedia, Public Record Office Victoria, Victorian Arts Centre Trust through the Performing Arts Museum. Funded by Arts Victoria, Multimedia Victoria and DCITA's New Technologies Working Party.
Partner organisations	
Audience(s)	General public and education audience at all levels.
No. of users per day	Current site, which is underdeveloped and has not been promoted, attracts 8000 visitors per month.
Special significance to students and teachers	The Gallery currently hosts over 100,000 supervised student visits to its premises partaking in program devised by its Education Services team. The multimedia content will be designed to not only respond to the Victorian Curriculum Standard Framework, but also to education requirements. This is assured as the Gallery employs professional educators.
Why it was/will be successful?	The Gallery's multimedia strategy has been planned in the context of its overall strategy, which in turn responds to Victorian state government policy initiatives. It has received funding from the Victorian state government and is overseen by a Steering Committee of senior management and Trustee representatives. Both Multimedia Victona and Arts Victoria are actively supportive of multimedia implementation in cultural organisations. The level of professional expertise that is being invested into the development of the service, the technology infrastructure and the content development. The commitment by the Gallery to promote this service as part of its long term strategy.
Suggestions for how the service could be improved	This is a three year project which will commence once the tenders have been evaluated.

Western Australian Initiatives

Curriculum Materials Information Services - Cataloguing website	
Responsible organisation	Education Department of WA
Contact person	Bev Blackwell Ph: 08 9264 4927 Fax: 08 9264 5708 bev.blackwell@eddept.wa.edu.au
Description of service provided	Information enabling efficient management of school library operations
Technology platform	Static html website
Metadata scheme(s)	Will be EdNA compliant
Arrangements for sharing information with other organisations	Freely available on Internet
Partner organisations	Nil
Audience(s)	Teacher librarians, resource teachers, library officers
No. of users per day	Not known
Special significance to students and teachers	Information tailored to WA users
Why it was/will be successful?	Relevant to WA users and initiatives. Can overcome communication difficulties within the school, speeds up communication to school
Suggestions for how the service could be improved	Service could provide searches based on SCIS subject headings as used in the school library catalogue.

Curriculum Materials Information Services (CMIS) Evaluation Web site	
Responsible organisation	Education Department of WA
Contact person	Sue Scott Ph: 08 9264 4603 Fax 08 9264 5708 Email: sue.scott@eddept.wa.edu.au
Description of service provided	Web site provides • information about curriculum resources, including software reviews, Internet site reviews, fiction, etc. • starting point for teachers wanting to use the Internet in the curriculum with links to collaborative projects, lesson plans, sites about Internet policy, usage and publishing. • teachers with links to professional development, professional associations, publishers and suppliers of curriculum materials. • support for school libraries - average prices, selection policy
Technology platform	Static HTML site
Metadata scheme(s)	Will be EDNA compliant
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	Teachers, students, administrators
No. of users per day	2000 hits
Special significance to students and teachers	Linked closely to WA curriculum framework and Student Outcome Statements. Teachers participate in the reviewing of materials including Internet sites.
Why it was/will be successful?	Relevant, easy to use, attractive, useful
Suggestions for how the service could be improved	With experience

Internet in the Curriculum	
Responsible organisation	Education Department of WA
Contact person	Keith Lightbody Ph: 08 0264 5016 Fax: 08 9264 4176 keith.lightbody@eddept.wa.edu.au
Description of service provided	Money for all WA Schools to purchase computer, service provider, telephone line and time for Internet connection. PD program for all schools to have one person trained in six modules of using the Internet in the Curriculum – that person trains the school staff.
Technology platform	
Metadata scheme(s)	
Arrangements for sharing information with other organisations	
Partner organisations	
Audience(s)	All WA government students and teachers
No. of users per day	
Special significance to students and teachers	
Why it was/will be successful?	
Suggestions for how the service could be improved	

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Other initiatives

- ASLA Teaching Information Skills CD - ACT Department of Education and Community Services
- Discovering Democracy CD - ACT Department of Education and Community Services
- Microsoft Technology Toolkit CD
- Worldbook Online
- Kidz Net - ACT Department of Education and Community Services
- Intouch Learning Online Training Package
- Telstra/ Schoolsnet National Initative for education focussed internet service
- The National "Key Competencies in Teaching" Project Site http://crilt.canberra.edu.au/keycomps/
- A number of ACT schools are developing Intranets and relevant resources eg Giralang Primary Schools Lesson Plans Database http://crilt.canberra.edu.au/lessonPlans/default.html
- ACT Governments Library Service Online http://www.library.act.gov.au/
- School of Isolated and Distance Education, contact point is Principal Don Boyd Ph: 08 9242 6318 Fax: 08 9242 6892 don.boyd@eddept.wa.edu.au
- Teaching and Learning Website for the Association of Heads of Independent Schools in Australia (being developed at the moment) - audience is Heads of schools rather than teachers specifically. It contains a HeadNet which is a password-protected, web-based board where Heads of Independent Schools can put up notices or queries for other Heads and these can be answered. There is also a contact list for Heads to contact each other easily and privately. Much of this initiative is similar to YakNet but the focus is different.
- Discover Website - contact Chris Laycock or Cec Murray Ph: 03 6233 6947 Chris.Laycock@central.tased.edu.au
- OPEN-IT - Involves development of extensive online learning resources. Contact Alistair Home Ph: 03 6233 5678 Alistair.Home@central.tased.edu.au
- A proposal has been put to the Curriculum Corporation Board to consider initiating activities to support collaborative content development. Members representing systems and sectors will be involved in this discussion and process.
- VicNet, other web services. Contact: Gary Hardy, Ph: 03 9669 9709
- Joint Council of Subject Associations of Victoria (JCSAV). Contact: Peter Bachelor.
- Online PD. Co-operative Multimedia Centre (Emerge). Contact: Rob Summers.